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Renewable energy market analysis in Kenya

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Laurea University of Applied Sciences
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Abstract

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This thesis was a research project conducted as part of the CONNECT project at Laurea University of Applied Sciences. The main aim of the project was to examine the current renewable energy situation and the opportunities for market entry for Finnish small and medium enterprises (SMEs) in Kenya, so as to support growth and accelerate internationalization in developing countries.

The availability of renewable energy sources in Kenya is enormous and about 77 percent of the people in Kenya have no access to electricity. This thesis examines the demand for electricity in Kenya, as well as the main competitors and how best to enter the market.

A qualitative research approach was used in this thesis project and questionnaires were sent to companies in the renewable energy field owned by the Kenyan government and also to the Finnish company, Finpro, which helps to internationalize Finnish SMEs. FinPro was chosen because it has experience in both the Kenyan and Finnish markets and is in a good position to guide the Finnish SMEs. The Kenyan company interviewed was the Kenya Electricity Generating company (KenGen). The investigations in this thesis help to provide information required to establish renewable energy sources in Kenya whether in urban or rural areas. The Kenyan Government encourages foreign investors to invest in this area by zero-rating import duty and removing Value Added Tax (VAT) on renewable energy, equipment and accessories. The ERC has prepared solar water heating regulations. These steps are intended to mitigate the challenges faced in exploiting the solar energy resource.

Kenya relies mainly on hydro-electric power which is unreliable due to changing weather conditions and increase in dry seasons. Kenya has high light intensity sunlight for 5-7 peak sunlight hours a day that can be tapped for solar energy, the greatest potential being in northern Kenya. Kenya has the potential for up to 3,000 MW of wind, especially in the wind-rich Northern frontier districts. While geothermal energy in Kenya has a potential of up to 10,000 MWe which is under-exploited in the rift valley. Biogas is not much documented but is an area of high potential as well, since most Kenyans are animal farmers.

Kenya is a gateway to East and Central Africa and with the establishment of the East African Community, which comprises Kenya, Uganda, Tanzania, Rwanda and Burundi; there is a potentially large market for Finnish SMEs. Finally, Kenya has a growing free market economy and Kenya joined the middle income economies.

Keywords Renewable energy, renewable energy sources, market entry, energy policy, energy situation, operating environment, cultural dimensions

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1 Introduction

"In recent times, renewable energy has emerged as a viable supply option to provide reliable and affordable energy services that have cross-cutting influence on a nation's ability to achieve the Millennium Development Goals. For poor communities with no regular access to reliable energy services, enhanced electrification or the availability of clean fuels based On renewable sources of energy could reduce poverty, improve health conditions and increase standards of living." Mr. Kandeh K. Yumkella, UNIDO Director General and Chairman of UN-Energy (2010,1).

Kenya is one country endowed with enormous potential in renewable energy resources and about 77% of people of Kenya have no electricity and those with electricity experience a lot of power shortages due to over reliance on hydroelectric power that depends mainly on amount of rain so that when the rains are high then output is high and when its low then it goes down as well.

1.1 Objectives and research questions

The objectives for this thesis research was to contribute to the CONNECT project which aimed to support growth and speed up internationalization of Finnish SMEs to developing countries, Co-creation of network modes for market entry in these countries by the Finnish renewable energy SMEs and develop a pilot test network creation modes for more effective market entry into the Kenyan market. This project was to develop internationalization skills of SMEs; improve the their ability to participate in value networks; increase the understanding and utilization of value potential of international students/expats for SMEs; open possibilities for new recruitments in renewable energy companies and also business opportunities for new intermediating companies in their sector as well as Co-creation of effective modes for network creation.

Research questions was targeted at examining renewable energy solutions that exist in the market already, how tough the competition was, who are the competitors and know about the price level, identify what kind of subsidies, tax reductions on renewable energy,who were the buyers of renewable energy and main customers, the buying pattern in relation to prices and quality, rating demand versus the supply of renewable energy solutions in Kenya, as well as to ascertain if oil discovery in Kenya might affect renewable energy business in Kenya,expose the most unexploited renewable energy resources and rate the growth of use of the following renewable sources namely solar power, wind power, biomass and waste to energy and finally to examine generally the future of renewable energy in Kenya.

1.2 Methodology

The research method which was used in this thesis was Qualitative. It is a type of scientific research which consists of an investigation that seeks answers to a question, systematically uses a predefined set of procedures to answer the question, collects evidence, produces findings that were not determined in advance and produces findings that are applicable beyond the immediate boundaries of the study (Mack,Woodsong,M.Macqueen,Guest,Namey,5)
The research questions were prepared in order to access the renewable energy market in Kenya, the level of competition, renewable energy situation, the potentiality of the renewable energy resources, business environment, government incentives as well as the players in the renewable energy industry in the country. This was to try and uncover the renewable market in Kenya and assist Finnish SME companies interested in venturing into the renewable market business to smoothly set base in Kenya and exploit the huge market potential of not only Kenya but East African as a whole.

PESTEL analysis elaborated the business environment in Kenya were examined. The questionnaire was send to educational institutions (universities), and renewable energy company in Kenya and also FINPRO because they understood both Finnish and Kenyan business environments and are already in Kenya. Then phone calls were made to follow up and ensure that the respondents respond to the questions.

The target groups were renewable (energy) companies in Kenya, learning institutions such as universities as well as Government agencies such as ministry of energy

1.3 Key definitions

According to clean energy ideas. Renewable Energy is defined as natural energy which does not have a limited supply. Renewable energy can be used again and again, and will never run out (clean energy ideas)

According to Energy Regulatory commission of Kenya (ERC), there was five renewable sources used most often in Kenya which includes the following:Biomass which comprise wood and wood waste, municipal solid waste, landfill and biogas, ethanol, and biodiesel.The water (hydropower),geothermal, wind and Solar energy.

KNBS-Kenya National Bureau of Standards
NGO'S-Non-Governmental Organizations
LAPSSET-Lamu Port –South Sudan –Ethiopia Transport Corridor. The project is composed of port, railway line, oil refinery, oil pipeline, airports, Highway; and Resort Cities

RES-Renewable Energy sources

FiT-Feed in Tarif

1.4 Structure of thesis

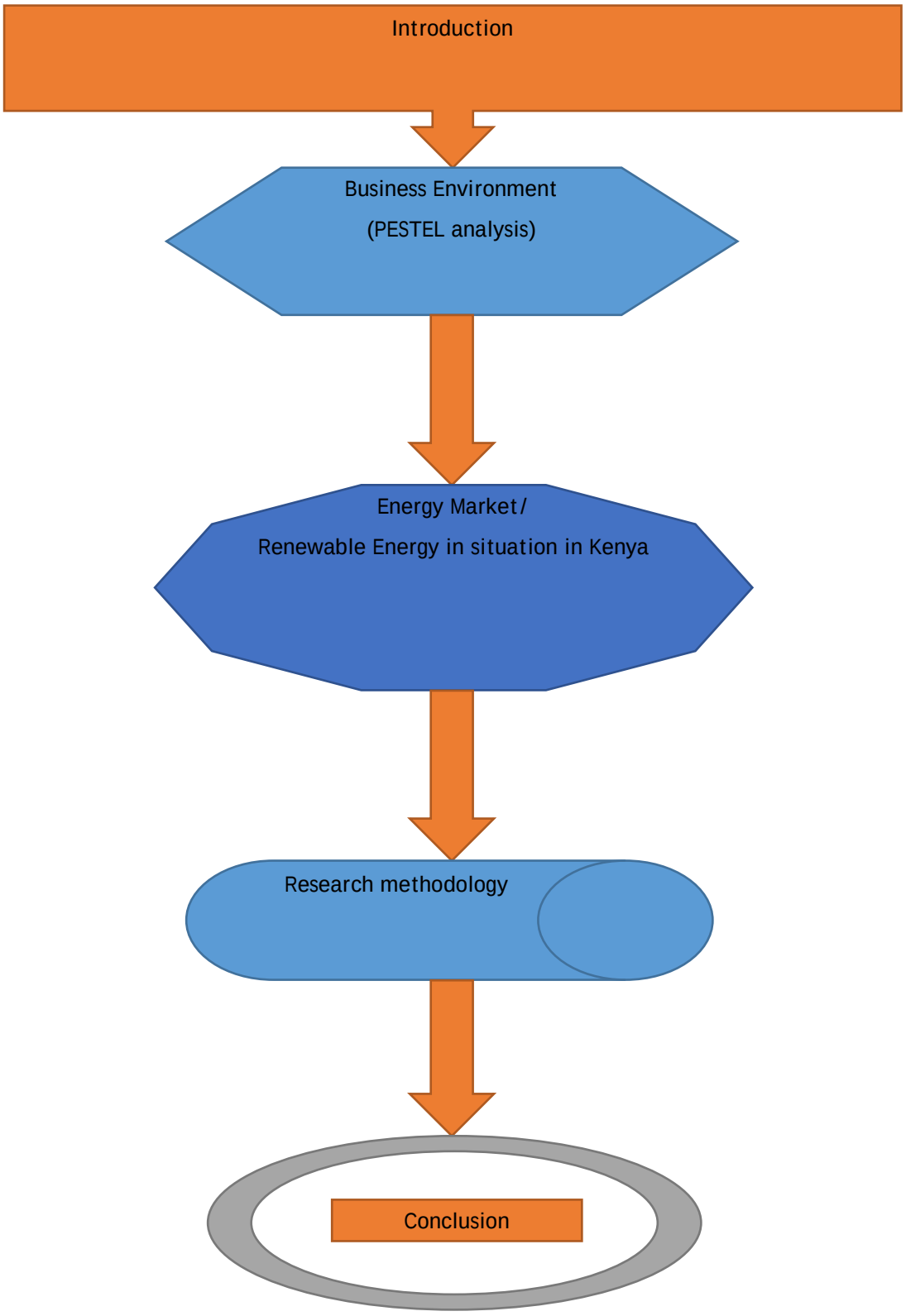

Figure 1: Structure of the thesis

The introduction and objectives of this thesis was discussed in chapter.In chapter two,the business operative environment(PESTEL analysis) was enumerated.In the chapter, political, economic, social, technological and legal business envionments was examined.In chapter three,the energy situation in kenya was discussed whereby the general energy situation ,industry structure,supply and demand,role of government,energy policy,challenges,foreign trade relations among others was covered.In chapter four,The research method used was through interview questions to renewable energy companies.Also aims of research and target was discussed.chapter five examined the renewable energy potential in kenya while chapter six analysed the relevant authorities in the sector and finally in chapter seven,conclusions and recommendations were made.

2 The Business operating environment in Kenya (PESTEL analysis)

This chapter analyses political,economic,social,technological,environmental and legal business envionments.

2.1 Political factors

business dictionary defines political environment as an organization or economic system where goods and services are exchanged for one another or for money.Every business requires some form of investment and enough customers to whom its output can be sold on a consistent basis in order to make a profit.Businesses can be privately owned, not-for-profit or state-owned. An example of a corporate business is PepsiCo, while a mom-and-pop catering business is a private enterprise.(business dictionary.com)

2.1.1 Politics

According to Kenya national bureau of standards (KBS), the Kenyan Government has done both political and governance reforms which was started by the grand –coalition government after 2007/08 elections since then there has been passage of new constitutional framework and its implementation is on course. The country conducted a peaceful general election on 4th march 2013(KNBS)

After the disputed elections grand coalition Government was formed. Constitutional reform that addresses the structure of government to create a more effective system of checks and balances is a key element of the reform agenda agreed as part of the power-sharing agreement. The process for producing a new draft constitution that was set out in the December

2008 Constitutional Review Act, Kenyans went to the polls on August 4, 2010 to vote on the new constitution. Reflecting broad support for fundamental change, 66.9% of those who voted endorsed it. The new constitution retains Kenya's presidential system but introduces additional checks and balances on executive power and greater devolution of power to the sub-national level. Fully implementing the new constitution required passage of several dozen pieces of legislation over a 5-year period. The 2012 national elections was the first conducted under the new constitution.

President Uhuru Kenyatta was elected in March 4, 2013 elections under the August 2010 constitution. His jubilee government was faced with a major test with the implementation of the new devolved system of governance, terrorist attacks and implementation of reform agenda in the country. (World Bank country overview Kenya 6.4.2014)

2.1.2 Division of power

Kenya’s new constitution of 2010 established a presidential system and gives additional checks and balances on executive power and envisions a process of decentralization. The implementation of the constitution and decentralization process was to be done progressively for a period of five years. (African Economic outlook 2014). The two levels of governments National and county governments exist with functions indicated by the constitution. The 47 county governments headed by the governors. Kenya’s constitutionally-mandated devolution was one of the most ambitious programs of its type in the world. The bulk of the decentralization reforms was be implemented since 2012 and impacts Kenya’s social stability, service delivery and fiscal health for years to come. (World Bank 2013)

2.1.3 Political stability

Since independence, Kenya had maintained considerable stability despite changes in its political system, localized violence surrounding elections, and crises in neighboring countries. This had been particularly true since the re-emergence of multiparty democracy and the accompanying increase in freedom, speech, the press, and assembly.2002 democratic and open elections were done and earned international observers judged it as free and fair. There was democratic evolution as the presidency and the parliamentary majority passed from the party that had ruled the country since independence to a coalition of new political parties. The government lost a referendum over its draft constitution in November 2005. This vote too was widely accepted as free, fair, and credible. The International Criminal Court summoned six Kenyans five high-ranking government officials among them the president and His deputy. The political situation was stable in Kenya.

2.1.4 International relations

Kenya maintained good relations with her neighbors including Sudan and Ethiopia despite internal tensions in those countries. Uganda and Tanzania have enjoyed good relations work for mutual economic benefit. Kenya's economy, infrastructure, and relative stability make it an influential player in the region. Kenya has played a key role in the negotiations to resolve the civil war in Sudan and in Somalia's stability. Comprehensive Peace Agreement was signed in Nairobi on January 9, 2005 a Sudan North-South. South Sudan became an independent state In July 2011.kenya Faced with untenable threat to its security and economy as a result of high-profile incidents involving kidnap and murder of European tourists, on October 16, 2011,kenya sent military forces into Somalia seeking to push back extremist elements. Kenya hosts more than 600,000 refugees, most of who are from Somalia (U.S Department of State 2013)

Kenya was pursuing regional economic integration, which could have enhanced long-term growth prospects. The Presidents of Kenya, Tanzania, and Uganda re-established the East African Community (EAC) In March 1996 for a common market. Rwanda and Burundi joined the community in July 2007 and 13 heads of state during a Common Market for Eastern and Southern Africa (COMESA) summit endorsed a move to adopt a COMESA customs union and set by December 8, 2008.EAC Common Market Protocol which allows for the free movement of goods and services across the five member states, took effect. Also the heads of state of EAC, COMESA, and the Southern African Development Community (SADC) agreed to work toward a free trade area among all three economic groups with the eventual goal of establishing a customs union. If realized, the Tripartite Free Trade area would cover 26 countries. (African economic outlook 2012)

2.1.5 Environmental policy

Environmental challenges facing Kenya were high population growth, deforestation, shifting climate patterns, and the overgrazing of cattle in marginal areas in the north and west of the country. Environmental Management and Coordination Act of Kenya were passed into law (EMCA) No.8 1999. It served as the main framework for environment law was among the steps in the country's commitment towards environmental sustenance. But there were some inadequacies in the Act because it only addressed issues of environmental management in a sectional spectrum.

There was effort towards national environmental policy. The Sessional Paper No. 6 of 1999 on Environment and Development advocates for the integration of environmental concerns into the national planning and management processes as well as provides guidelines for environmental sustainable development.

The various bodies that dealt with environmental issues were the National Environmental Management Authority (NEMA), Kenya Wildlife Service (KWS), Kenya Forestry Service (KFS); the Public Complaints Committee (PCC) and the National Environmental Tribunal (NET) and therefore the document and guidelines challenge is in the linking implementation framework with these statutory bodies (Kenya environmental and political web blog post on 27 January 2009)

The revised draft of the National Environmental Policy, dated April 2012 which sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources and also recognizes that natural systems are under intense pressure from human activities particularly for critical ecosystems including forests, grasslands and arid and semi-arid lands.

The Policy objectives was geared towards developing an integrated approach to environmental management, strengthening the legal and institutional framework for effective coordination, promoting environmental management tools, supporting the implementation of the Forests Act 2005, and developing national standards and appropriate forest-based development mechanisms in emerging carbon markets.

There were key policy statements that came from the forestry and ecosystems section of the National Environmental Policy, include the Government of Kenya's pledge to formulate an innovative strategy to increase forest and tree cover to at least 10% as required under the new Constitution enacted in 2010,develop and implement a National Strategy for Rehabilitation and Restoration of degraded forest ecosystems, protect and conserve forests located in key water catchment areas, support effective implementation of the Forests Act, 2005 ,develop and implement cost-effective, objective and measurable national standards, principles and criteria of sustainable forest management and develop and support appropriate forest-based development mechanisms in the emerging carbon markets(REDD counties database 2012)

2.1.6 Public oownership

Kenya is a member of the East Africa Community (EAC) and the Common Market for Eastern and Central Africa (COMESA) hence this provides prospective investors with access to a combined market of over 400 million consumers.

Investment law in Kenya legally accords foreign same treatment as local companies.

There were no restrictions on investment by foreigners in private companies and foreigners can be directors of companies. Foreigners have freedom to own land on the basis of leasehold tenure only, not exceeding ninety nine years. Minimum Kenyan co-ownership in insurance companies, banks and telecommunications companies is mandatory, while at least 25% of the shares of companies listed on the Nairobi Stock Exchange must be held by Kenyans. Certain dealings in agricultural land and beach-front property involving non-citizens are prohibited unless special approval is obtained. (Kaplan & Stratton Advocates 2012)

2.1.7 Corruption

According to transparency international; the East Africa bribery index, Bribery prevalence in Kenya remained high as the country moved from fourth place recorded in 2011 to third in the 2012 East African Bribery Index (EABI) with an aggregate index value of 29.5% up from the 28.8% recorded last year as compared to other East African counties.

Rank	Country	Bribery Aggregate (%)
1	Uganda	40.7
2	Tanzania	39.1
3	Kenya	29.5
4	Burundi	18.8
5	Rwanda	2.5

Table 1: East African bribery index

The new constitution promulgated in August 2010 was based on good governance, transparency, integrity, and accountability strengthens the fight against corruption and therefore a lot of Positive developments in relation to corruption and investments have been achieved. Political interference in the private sector has been reduced via structural reforms, including privatization and deregulation, while regulatory procedures have been streamlined and simplified. Kenya was hailed as one of the world's top ten reformers by the World Bank & IFC in 2009.

There were an increasing number of government agencies to have codes of conduct and ongoing reforms of the public financial management (PFM) systems meant to greatly enhance transparency and accountability in the utilization of public resources and thereby improve public service delivery.

Also an ethics and governance committee of the judiciary has been established to assess the level of corruption in the judiciary, report on individual cases and recommend remedial measures.

The government launched an Open Data Portal. Kenya was the first African country to make government data accessible to ordinary citizens via the Internet.

The reconstitution of the Judicial Service Commission has led to progress within the judiciary with decreasing executive influence (Business anti-corruption portal 2013)

Kenya ethics and anti-corruption commission has been established to help fight the vice. President Kenyatta while addressing Kenyan parliament on 2nd may 2013 pledged to fight corruption and make the country attractive for investments (Daily nation 2nd 2013)

2.1.8 Taxation policy

Kenya's tax system has undergone reforms and hence a modern tax system. On policy side, new value added tax has been introduced ,the rates schedules rationalized and simplified and

also external tariffs had been brought in harmony with those in neighboring countries in east africa.Additionally,adminidtrative and institutional reforms made. For instance the modern tax system has a credit invoice VAT, a PAYE individual income tax and set of exercise taxes on things like alcohol, cigarettes and gasoline.(Tax Reform in Kenya: Policy and Administrative Issues by Nada O. Eissa and William Jack 0ct 2009 Georgetown University p .2)

Kenya Revenue Authority (KRA) has mandate to collect all revenue and management of the tax system. Kenya has double taxation treaties which in certain circumstances mitigate the tax charge. Treaty countries are Canada, Denmark, Norway, Sweden, India, Zambia, United Kingdom, France and Germany whereas neither the USA nor South Africa has double taxation treaties with Kenya.

The benefits to employees such motor cars, housing and loans are taxable and employee taxes were based around a pay-as-you-earn income tax deduction, a national social security fund and a national hospital insurance levy.

The Capital deductions that exist were available on industrial buildings, hotels, plant and machinery and mining investment. The capital allowances are provided for on the basis of cost on a reducing balance basis.

Also excise and customs duties on the goods produced or imported are payable depending on the nature on its nature. There was no capital gains tax system presently in force. There was no death duties/taxes payable on personal estates. (Kaplan & Stratton advocates 2012)

2.1.9 Role of NGOs and community initiatives

Thousands of NGOs exist in Kenya and involved in all sectors of national development. They have played a big role in education, health, the environment and gender empowerment. The civil society spearheaded Kenya's poverty alleviation strategy. The NGO's seeking official recognition by the government should register with the Registrar of Societies; under Part III of the Non-Governmental Organizations Coordination Act, 1990(Commonwealth of Nations network)

The NGO'S also create public awareness on important issues in society, advocate for necessary changes in society, and monitor the activities of governments, as well as multinational organizations and other powerful entities with a view to ensuring good governance. they help develop alternative models of development that governments' bureaucracies might not have the flexibility to develop but which they (governments) could be interested in adopting if proved to be successful and help implement programs especially at the grassroots level.

2.1.10 Kenya and Finland

Finland recognized Kenya on 13th December 1963 and diplomatic relations established on 14 June 1965.Finland has embassy in Nairobi and an honorary consulate in Mombasa (ministry of foreign affairs Finland)

KPLC has relied on imported poles from Chile, Finland, South Africa and Tanzania (Kenya Environmental & Political News Weblog 2008)

According to Finpro, Finland had the following exports and imports with Kenya between year 2007 and 2011.

Milloin EUR	2007	2008	2009	2010	2011
Finnish exports	43.0	51.3	19.3	80.8	19.9
Finnish import	13.1	15.3	19.3	23.2	18.0
Trade balance	30.0	36.0	0.1	57.6	1.9

Table 2:Trade between Kenya and Finland during 2007–2011(finnish customs)

This means that Finland is bought less and sold more to Kenya during that period from 2007 to 2008, and 2010 but the trade balance in 2009 and 2011 was 0.1 and 1.9 respectively.

Product	Value of exports (million EUR)
Medicinal and pharmaceutical products	5.210
Power generating machinery and equipment	4.491
Office and ADP machines	2.508
Paper, paperboard and articles thereof	2.101
Telecommunications and sound recording equipment	0.121
Electric machinery and parts	0.074
General idustrial machinery	0.061
Buildings; sanitary, lighting etc.fixtrs	0.047
Plastics in primary forms	0.043
Machinery for specialized industries	0.041
Total exports to Kenia	19.989

Table 3:Top ten Finnish Export products (SITC 2 level) in 2011(Finnish customs)

Top ten Finnish Import products (SITC 2 level) in 2011

Product	Value of imports (million EUR)

Coffee, tea, cocoa and spices	13.053
Vegetables and fruits	3.596
Crude animal and vegetable materials	0.883
Chemical materials and products	0.299
Miscellaneous manufactured articles	0.075
Apparel and clothing accessories	0.052
Electric machinery and parts	0.023
Office and ADP machines	0.021
Travel goods, handbags and SIM containers	0.020
Wood and cork manufactures	0.017
Total importsfrom Kenya	18.085

Table 4: Top ten Finnish Import products (SITC 2 level) in 2011(Finnish customs)

2.2 Economic factors

Economic environment is the totality of economic factors, such as employment, income, inflation, interest rates, productivity, and wealth, that influence the buying behavior of consumers and institutions.(businessdictionary.com)

2.2.1 Kenya vision 2030

Kenya's strategy 2030 strives objective was to make Kenya a globally competitive and prosperous economy. The vision also strives to make Kenya to be a newly industrialized middle income economy where Kenyans enjoy high quality of life in a clean and secure environment and also to inspire achievement of millennium development goals (MDGs) by 2015.
Energy as part of infrastructure was identified among the enablers of socio-economic transformation of the economy envisioned to provide cost-effective, world class infrastructure facilities and services. (Kenya vision 2030)

2.2.2 Economic stability

Kenya's economy was diverse one of the fastest growing countries in Africa even though its economy had not developed much recently. Agriculture was its largest source of revenue and

exports several different kinds of produce in return of machinery and equipment. (World Bank 2013)

Its economy was the largest East Africa and regional financial and transportation hub. After independence, Kenya promoted rapid economic growth through public investment, encouragement of smallholder agricultural production, and incentives for private which are often foreign industrial investment.

The economy performed well until downturn caused by among other things the global financial crises, high fuel prices, persistent drought, high food prices and disruption of key economic sectors in early 2008 after the post-election crisis. This slowed economic growth from 7.1 percent in 2007 to 1.7 percent in 2008 (KNBS)

Kenya economy has maintained a significantly moderate growth since 2009 to 2013 and was expected to do well in 2014 (African Development Bank Kenya economic outlook 2014)

2.2.3 GDP value and growth

The value of a country's overall output of goods and services (typically during one fiscal year) at market prices, excluding net income from abroad8businessdictiomaty.com)

2.2.4 Macroeconomic indicators 2012

	2010	2011	2012	2013
Real GDP growth	5.6	4.4	4.2	4.5
Real GDP per capita growth	3	1.7	1.5	1.8
CPI inflation	4.1	14	9.6	6.3
Budget balance % GDP	-7	-4.5	-4.7	-3.5
Current account % GDP	-6.8	-5.5	-6.7	-6.1

Figures for 2010 are estimates; for 2011 and later are projections.

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Table 5: Macroeconomic indicators 2012(African economic outlook 2012)

2.2.5 Real GDP

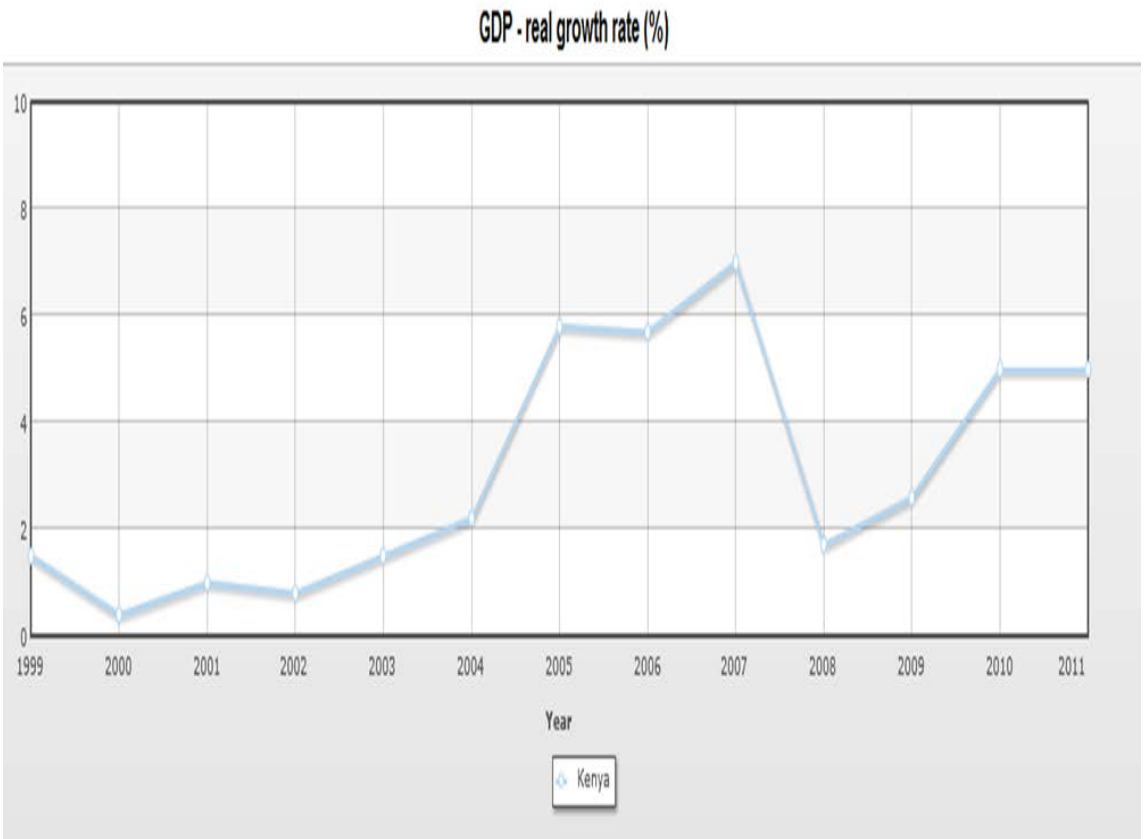
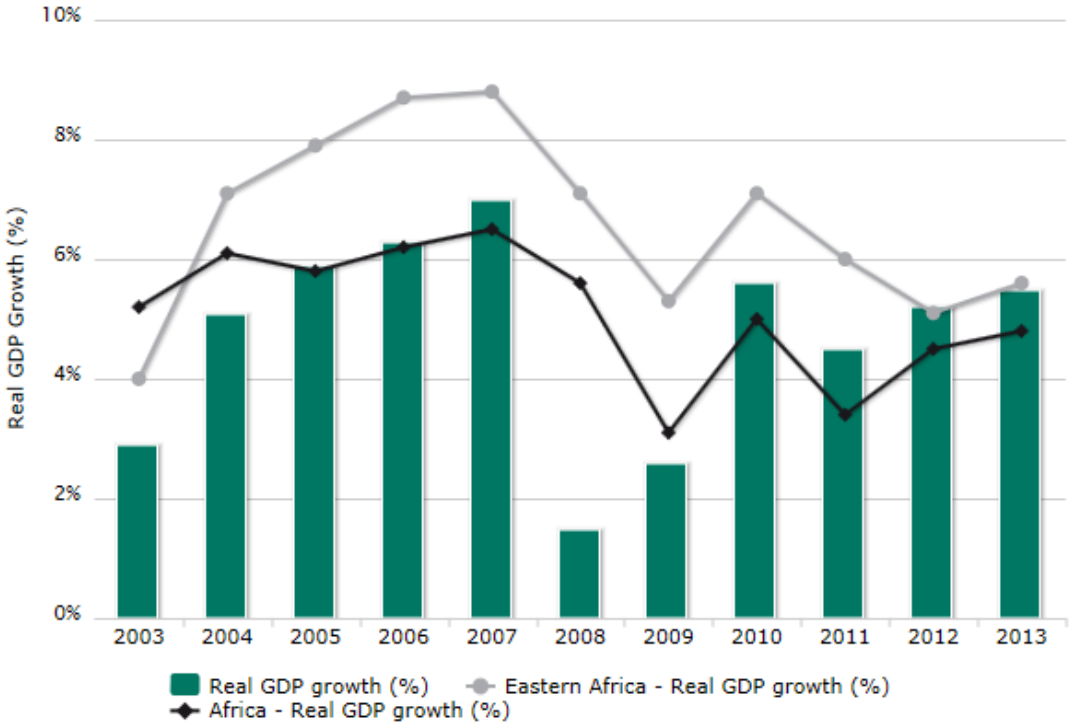


Figure 2: Real GDP(CIA Factbook)

The Kenyan economy grew significantly from 2002 when reaching 7 percent in 2007.the dropped in 2008 to 2 Percent because of post-election violence which erupted in December 2008 to January 2009.in 2011 there was significant decrease in a Gdp from 5.6% in 2010 to 4.5% in 2011.in 2012 the economy growth rate was at 5.1% and is estimated to grow further at 5.6% in 2013.

The growth rate recorded in 2012 of 4.7 percent was attributed to a stable macroeconomic environment, the peaceful elections in March 2013, and smooth transition of political power. The World Bank projected a higher growth rate of 5.7% in 2013 due to support by high investment and low interest rates. The Gross Domestic Product (GDP) was expected to improve further to 6.0 percent in 2014 (World Bank news, June 17, 2013)

2.2.6 Real GDP Compared to east Africa and Africa economies.



Figures for 2010 are estimates; for 2011 and later are projections.

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Figure 3: Real GDP Compared to east Africa and Africa economies(African developement bank)

Kenya as compared to Africa and east Africa respectively, is almost at bar with real GDP growth for Africa but below that of East Africa.

2.2.7 Purchasing power parity

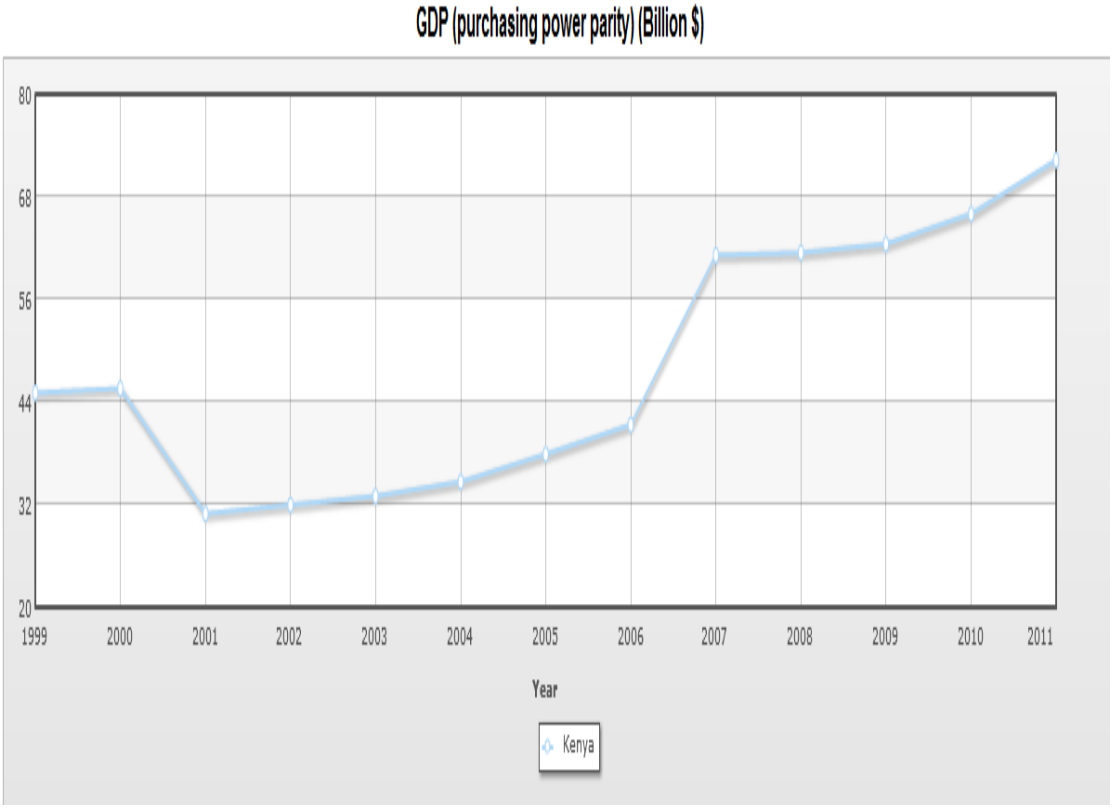


Figure 4: Purchasing power parity(CIA EST 2012)

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
32	33.03	34.68	37.89	36 61	41..22	61.51	66.03	62.48	72.34

GDP by sector (CIA EST 2012)

The country Gdp is dominated by services.

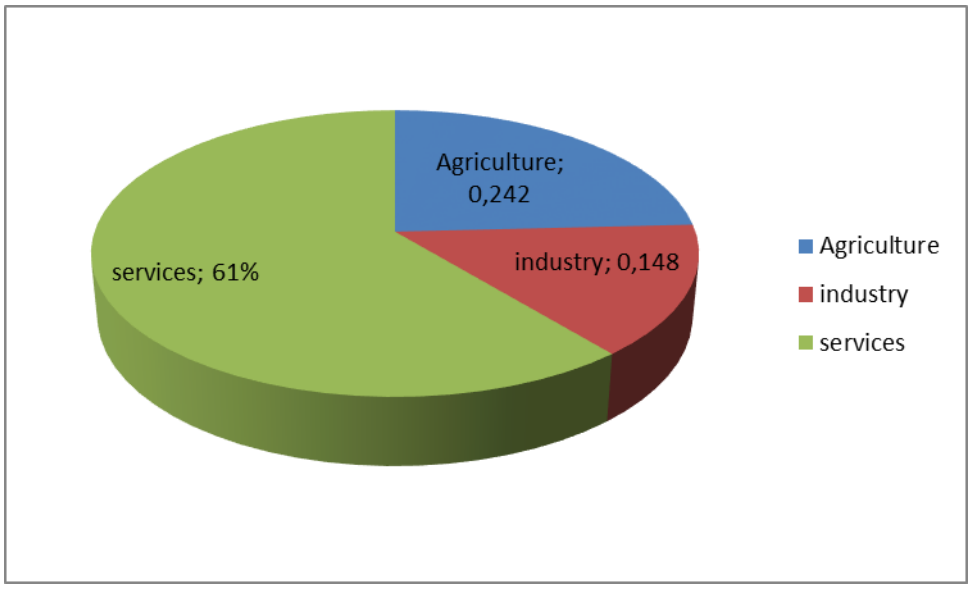


Figure 5:GDP by sector (CIA Factbook est 2012)

Agriculture	14,2%
Industry	14,8%
Services	61%

The service industry the engine of Kenya's economy because it takes 61% of GDP.

2.2.8 Inflation rate

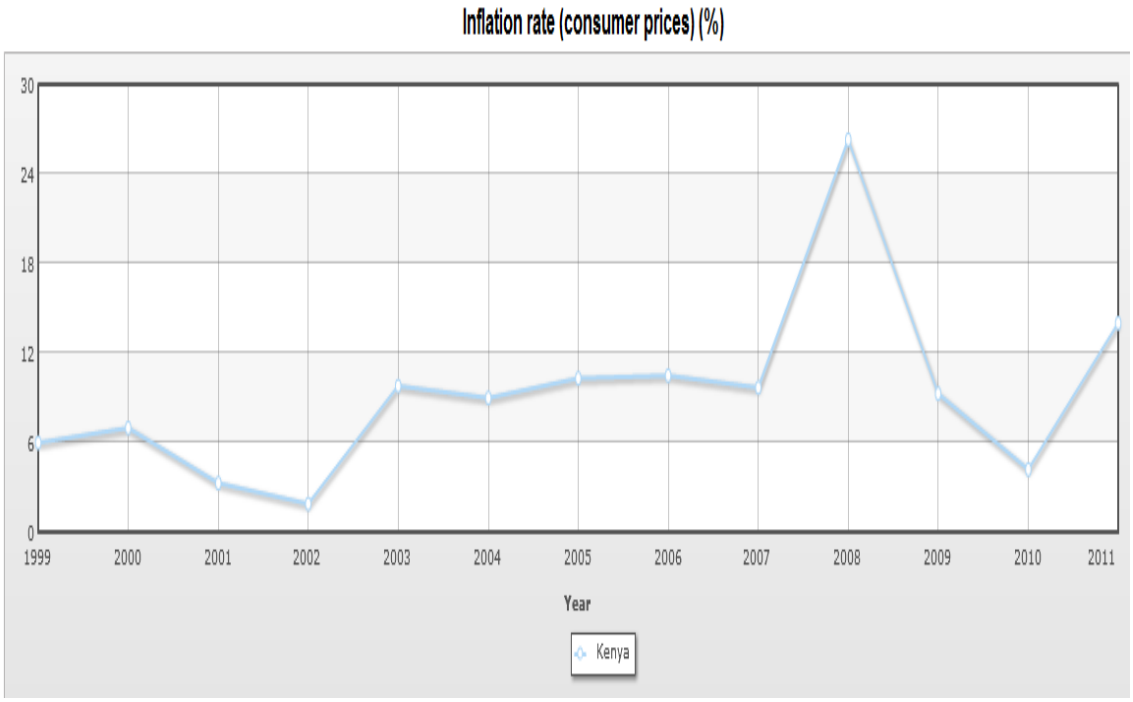


Figure 6:3.4 Inflation rate(CIA factbook 2012)

Inflation in 2008 was very high 26 % and thus low GDP growth rate. Also in 2011 it was quite high at 13%.

According to World Bank Kenya overview, 2013 registered low inflation and stable interest rates. Inflation was down to 4.5% by the end of February, from a high of 18% in early 2012, and the shilling remained stable at Sh85=US$1 against major trading currencies. (World Bank Kenya overview 19, 2013)

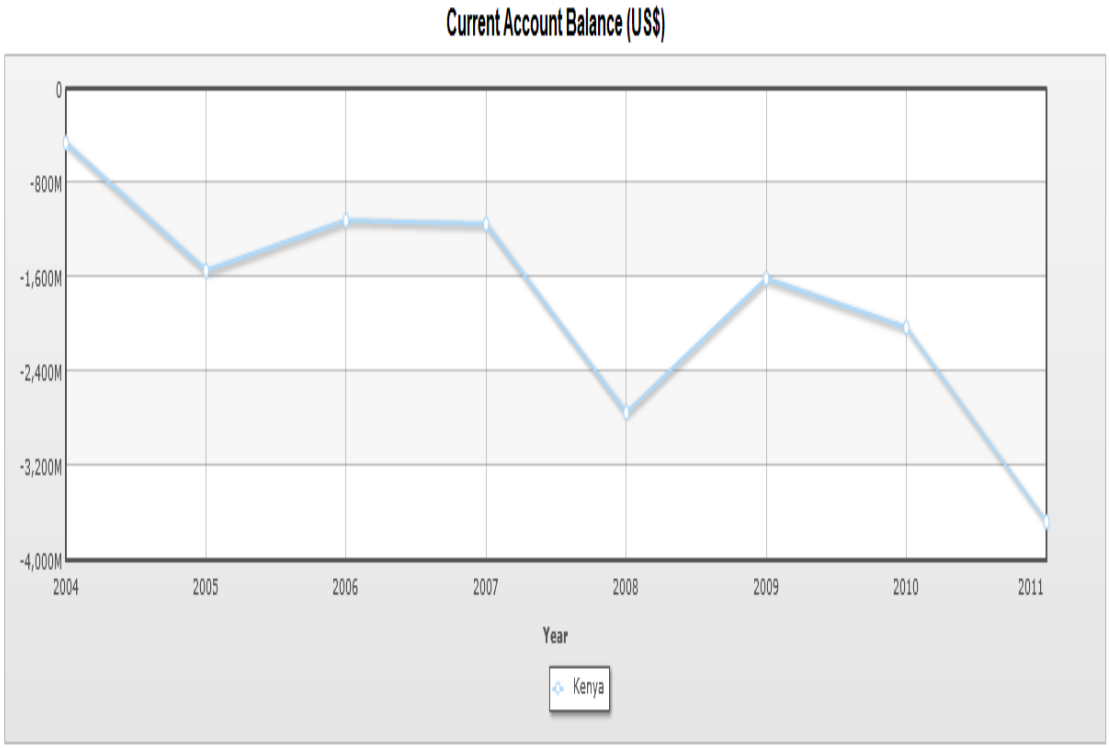


Figure 7:current account balance(CIA Factbook 2012)

SOURCE: CIA Factbook

2004	2005	2006	2007	2008	2009	2010	1011
59,2M	1,543T	1,19T	1,147T	2,745T	1,611T	2,024T	3,675T

2.2.9 labor force

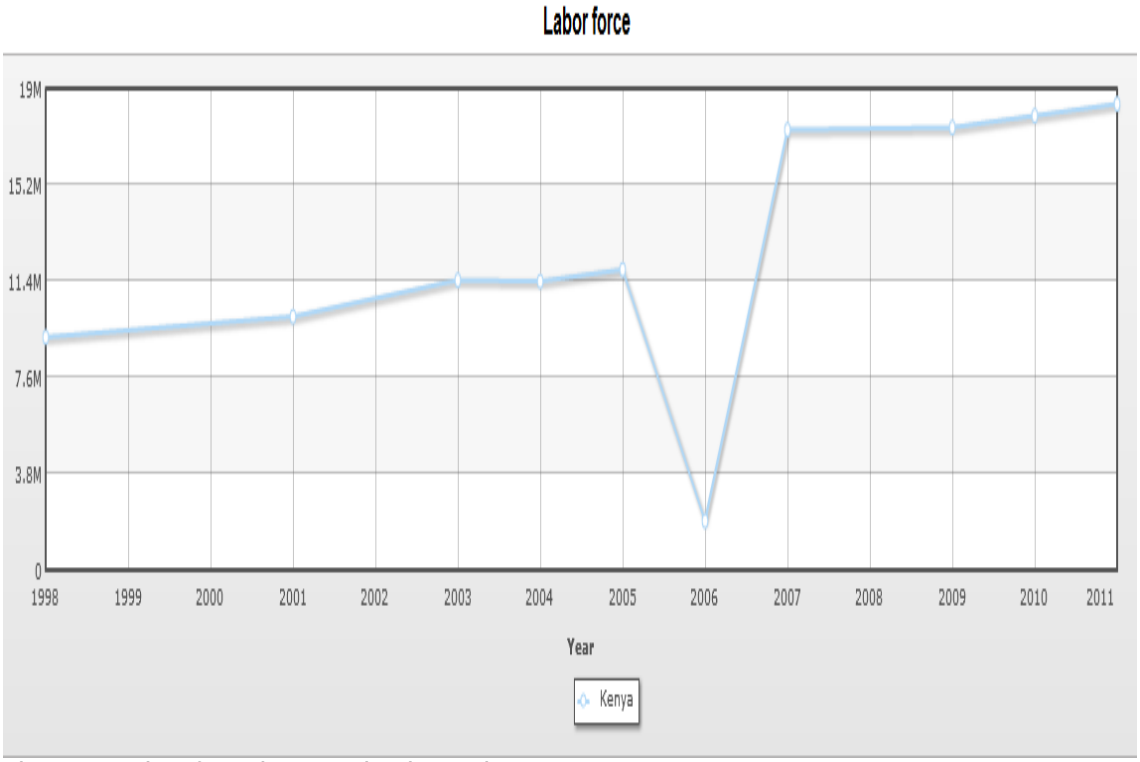


Figure 8: Labor force(CIA Factbook 2012)

1999	2001	2003	2004	2005	2006	2007	2009	2010	2011
9,2M	10M	11.45M	11,4	11,85M	1,96M	17,47M	17,47M	17,94M	18,39M

Source: CIA factbook

Kenya's labor force has grown significantly over the years reaching 18.4 million in 2011.

2.2.10 Labor force by occupation

Despite services carrying 61% of GDP, Agriculture employs 75 percent of the labor force while Services and industry takes 25%.

2.2.11 Exchange rate

Exchange rate according to business dictionary was defined as Price for which the currency of a country can be exchanged for another country's currency.

For example If Euro exchange rates for Kenya Shilling stand for 120; it means that 1 Euro can be exchange for 120 Kenya shillings.

The exchange rate is among the most important determinants of a country's relative level of economic health. The exchange rates are among the most watched analyzed and governmentally manipulated economic measures.

Kenya shilling is the currency for Kenya and currency code for Shillings is KES, and the currency symbol is KSh.kenyan currency coins are: Coins: KSh1, KSh5, KSh10, KSh20 KSh50, and KSh40.
Banknotes: KSh50, KSh100, KSh200, KSh500, KSh100.

Kenyan Shillings **(**KES**)** to **1** Euro **(**EUR**)**

The graph below shows historical exchange rates between the Kenyan Shilling (KES) and the Euro (EUR) between 3/9/2014 and 4/6/2014

Figure 9:Exchange rates between the Kenyan Shilling (KES) and the Euro (EUR)(Exchange rate .org)
The exchange rate for a period of about 1 month has been unstable.

2.2.12 Division of income

Gini index measures the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution. Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality (World Bank data)
According to World Bank, the distribution of income as measured by the Gini coefficient was estimated at 39% in rural areas and 49% for urban areas which can be considered to be pre-crisis. In the rural areas Income disparities had gone down since 1997, while the disparities in the urban areas have increased slightly. The Commission on Revenue Allocation had allocated a weight of 20% to poverty incidence. Overt incidence was one of the five criteria used in the revenue sharing formula for resources to the county governments.

Kenya Integrated Household Budget Survey (KIHBS) of 2005-2006 indicates that national absolute poverty declined from 51% in 1997 to 46.1% in 2005-2006 which was high as compared to its neighbors where Tanzania was about 36% and Uganda about 31%. In overall the poverty declined from 53% to 49% in rural areas, while in urban areas, poverty declined from 49.2% in 1997 to 34% over the same period.
Inequality in Kenya remains high and there is a regional disparity in the distribution of poverty the lowest incidence of rural poverty was in Central province with 30.3%, followed by Nyanza 47.9%, Rift Valley 49.7%, Eastern 51.1%, Western 53.2%, Coast 69.7%, and North Eastern province 74.0%.(World Bank country overview 2013)

2.3 Social factors

The facts and experiences that influence individuals' personality, attitudes and lifestyle. The marketing department of a business needs to take into account the various social factors characteristic of the consumer groups it is targeting to help increase a product's appeal to those potential buyers.(businessdictionary.com)

2.3.1 Kenyan people

The Kenyan people are diverse with approximately 42 ethnic/tribes communities among others. According to ethnic communities, they comprise of Kikuyu which was 22%, Luhya 14%, Luo 13%, Kalenjin 12%, Kamba 11%, Kisii 6%, Meru 6%, other African 15%.The non-African for instance Asian, European, and Arab were 1%.The official languages are Languages English (official) and Kiswahili. Kikuyu is the highest populated as compared to others while the non-Africans are the least populated.

2.3.2 Religion

Christianity was the main religion while the population that adheres to Islam or indigenous beliefs varied widely. About 45% were Protestants, Roman Catholic 33%, Muslim 10%, and indigenous beliefs 10%, other 2%.

2.3.3 Population structure

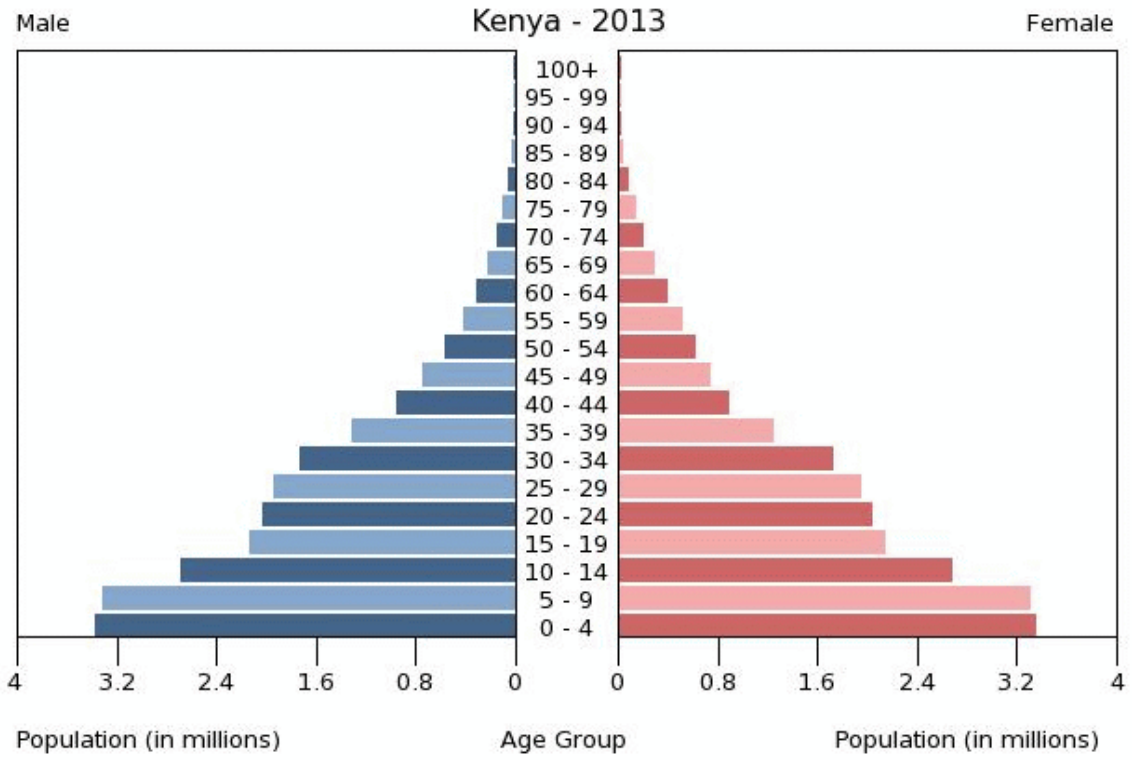


Figure 10:Popoulation structure 2013(CIA factbook 2013)

Age structure: 0-14 years: 42.4% (male 9,357,084/female 9,299,586)
15-24 years: 18.8% (male 4,148,153/female 4,147,896)
25-54 years: 32.4% (male 7,210,891/female 7,070,217)
55-64 years: 3.6% (male 719,374/female 876,458)
65 years and over: 2.7% (male 529,873/female 678,124) (2013 est.)

Kenya's population was estimated to increases by one million every year. More people were moving to urban areas according to the Bank Demographic trends. Also the estimates showed that half of Kenya's population will live in cities by 2050(World Bank 2013)
Kenya's population was estimated to be 43,013,341 as at July 2010. The urban population are 22% of total population (2010) while rate of urbanization stands at 4.2% annual rate of change (2010-15 EST.).The major cities are Nairobi which was the capital city and Mombasa whose population are 3.375 million and 966,000 (2009) respectively
Life expectancy at birth of the total population was 63.07 years. In terms of gender male are 61.62 years while female at 64.55 years (2012 EST.)Total fertility rate 3.98 children born/woman (2012 EST.)
The prevalence of HIV/AIDS in adult was 6.3% (2009 EST). The total number of People living with HIV/AIDS were estimated to be 1.5 million same year.

Money spend on education were 7% of GDP (2006).About 85% of those of 15 and over can read and write. Concerning the gender male literacy level is higher than the female with literacy level of 90.6% for male and 79.7% female: (2003 EST.) (CIA fact book)

2.3.4 Literacy levels

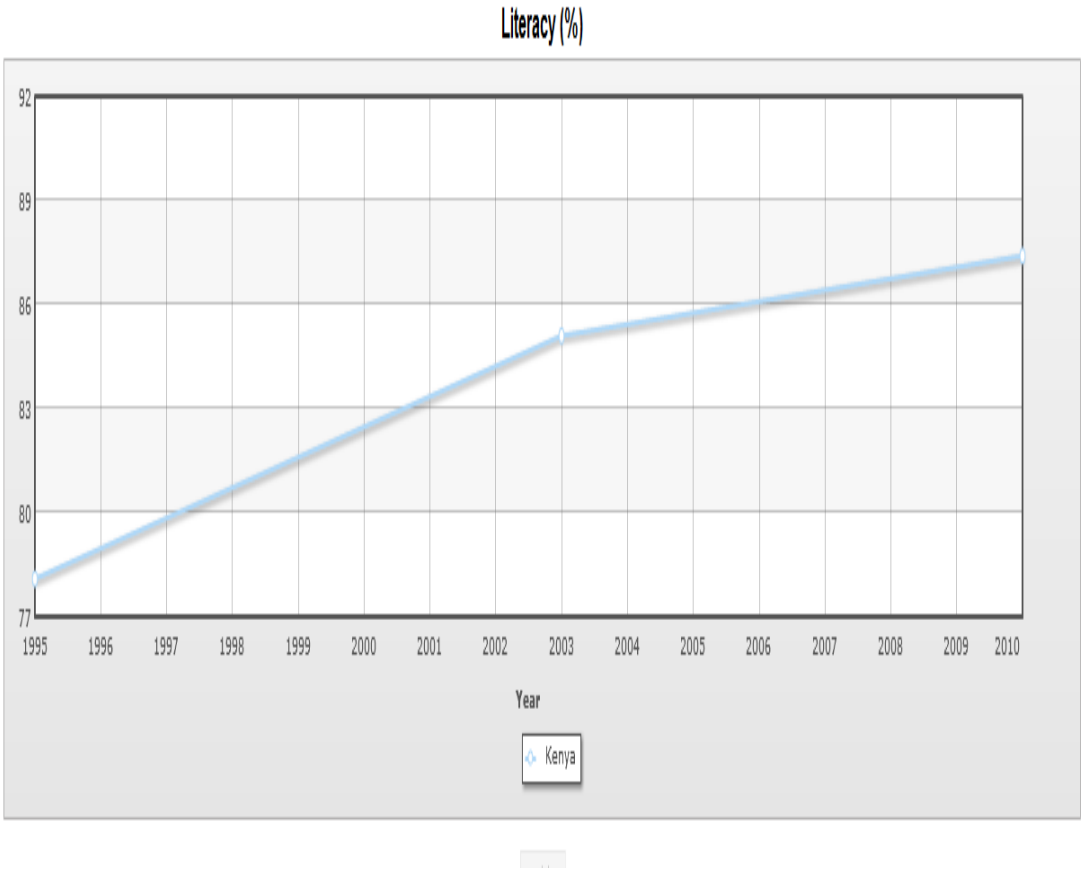


Figure 11: literacy levels(CIA factbook 2013)

country	1995	2003	2010
Kenya	78.1	85.1	87.4

The literacy levels are high in the country at 87.4 percent as compared to 1995 which was 78.percent.

2.3.5 Human rights

The constitution anchors Kenyan Human Rights commission. It advocates for initiatives aimed at ensuring the comprehensive observance and implementation of the constitution and the meaningful participation of the citizenry in governance and policy creation and it promotes,

protects and enhance full spectrum of human rights and fundamental freedoms((Kenya human Rights Commission)

Kenya is among members of the United Nations and African union and has ratified many UN Human rights conventions binding it commitments internationally to adhere to standards laid down in the universal human rights documents.

Therefore Kenya may complain UN human Committee. As a member to the UNESCO Citizens may complain through UNESCO procedure for human rights violations as well as also having the option of employers' or workers or organizations of Egypt may use ILO procedure in the cases of those conventions which Kenya has ratified.

Kenya is a member of African union (AU) and NGO'S and citizens may file complains to African commission on human and people's rights. Also complains can be filed according EU guide-lines to embassies of EU member states or the Delegations of the European Commission. Kenya is a member of international criminal court (National Commissions for UNESCO of France and Germany 2010 Claiming Human Rights in Kenya 2010)

2.3.6 Public health

public health isthe general health of a community and the measures taken to protect it(dictionarycentral.com)

2.3.7 Health system

The basic primary healthcare was provided the primary healthcare centers and dispensaries provide the basic primary care. Dispensaries were run and managed by Registered while nursing officers does supervision. The services provided were outpatient services for simple ailments such as the common cold and flu, uncomplicated malaria and skin conditions. Those patients who cannot be managed by the nurse are referred to the health centers.

Sub-district, district and provincial hospitals provide secondary care.

Sub-district hospitals are similar to health centers with the addition of a surgery unit for Caesarean sections and other procedures. District hospitals usually have the resources to provide comprehensive medical and surgical services. Provincial hospitals are regional centers which provide specialized care including intensive care, life support and specialist consultations.

2.3.8 Hospitals

There were over 4,700 health facilities countrywide whereby the public sector system accounted for about 51% of these facilities. National referral hospitals, which represent the apex of the healthcare system the best quality of care. For instance, they provide diagnostic, therapeutic and rehabilitative services. Kenyatta National Hospital in Nairobi and Moi Referral

and Teaching Hospital in Eldoret were public National referral hospitals. Private hospitals of same standard the Nairobi Hospital and the Aga Khan Hospital also in Nairobi.
In 2004, there were 16 physicians and 128 nurses per 100,000 of the population. Third level care is provided at the general hospitals Moi and Kenyatta, both located in Nairobi while gaps which regularly appear in the system, are filled by private and church run facilities

2.4 Technological factors

According to Kenya National bureau of statistics, Kenya's technological environment had advanced tremendously for the past 10 years especially in ICT sector. The country had fiber optic in place and it was to be connected to all parts of the country. Proper structures were being put in place to ensure that quality data collected and transmitted from all parts of the country. Also the Bureau was to work towards using its international networks and partnerships to ensure that current statistics on the latest technology-based-trade. The investment opportunities among them opportunities in data analysis in business process outsourcing are availed for faster socio- economic development of the country. (KNBS).
The reduced tax incentives on computer software and hardware were introduced by the government so as to make them affordable and encourage use of ICT. The Fabre optic cable had increased capacity and reduced costs in telecommunications. It was estimated that there were about 300,000 fixed lines phone connectivity,14 million mobile phone subscribers and 1.5 million internet users has opened many parts of the country to telecommunications and thus the private and public sectors are increasingly embracing electronic service provision. The way of handling financial transactions widely changed particularly to the unbanked sectors due to new innovations for such as M-PESA and ZAP (KEPSA)
Culturally, Kenyans are known for their willingness to embrace new technologies. For example, Intel created the "Technology Metabolism Index" showing how technology diffuses through the total population of a given country once introduced. Kenya received a +5, the highest possible rating for diffusion of new technologies. This has been reflected in Kenya's speedy adoption of mobile phones and small-scale solar home systems for off-grid rural solutions. The small scale panels are less those of less than 20wattanels. (Invested Development 2012)

2.5 Environmental factors

An identifiable element in the physical, cultural, demographic, economic, political, regulatory, or technological environment that affects the survival, operations, and growth of an organization(business dictionary.com)

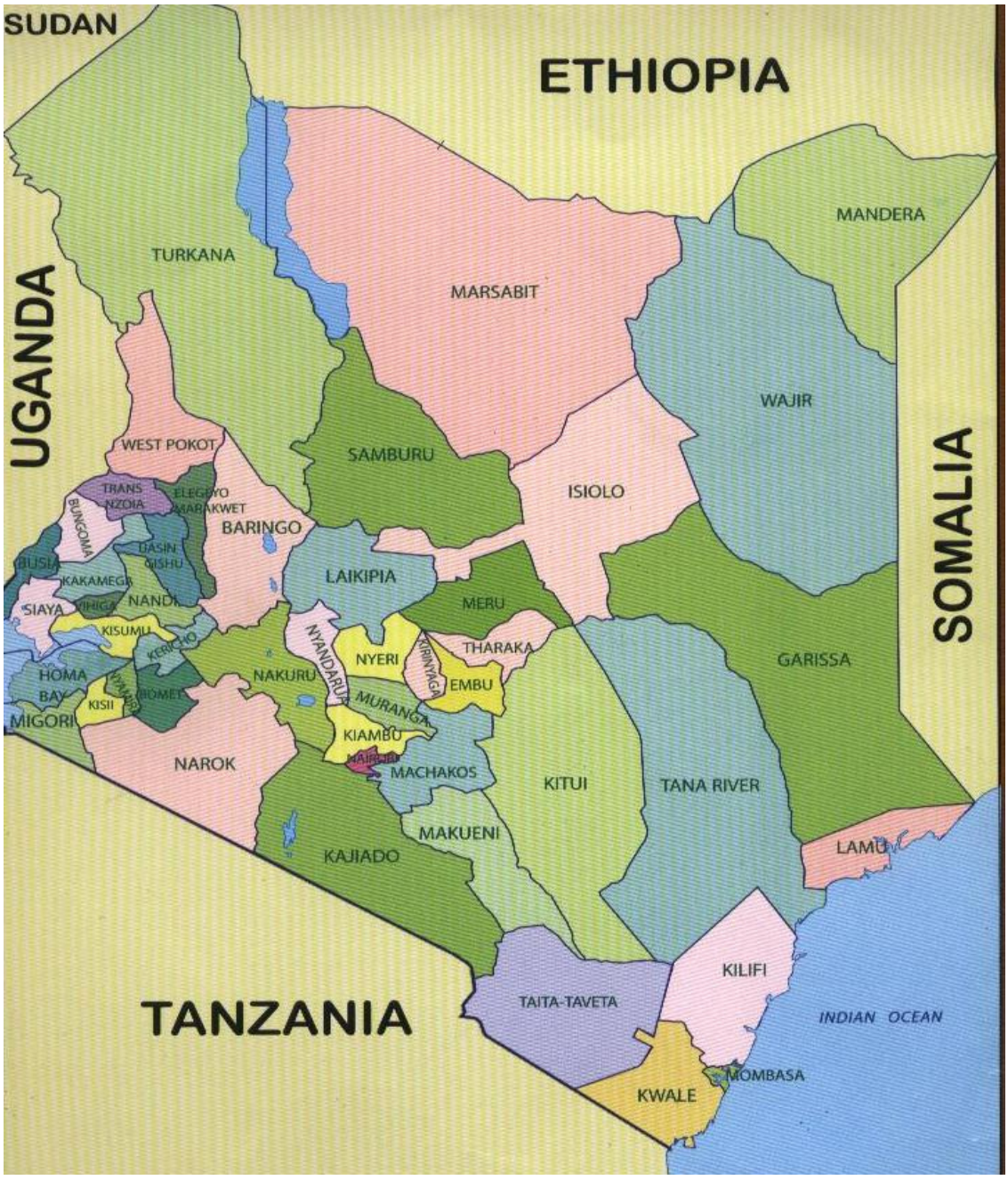
2.5.1 Geography

Kenya lies on the coast of Indian Ocean across the equator in east-central Africa. The country is twice the size of Nevada. To the east it borders Somalia, Ethiopia to the north, Tanzania to the south, Uganda to the west, and Sudan to the northwest. The land on the northern part of Kenya is arid while the southwest corner is in the fertile Lake Victoria Basin. The length of the eastern depression of the Great Rift Valley separates western highlands from those that rise from the lowland coastal strip. (Infoplease.com Kenya p.1)

In terms of area, Kenya is the 47th largest country in the world with 582,646 square kilometers. The economy of Kenya suffers from a high population growth rate and rampant corruption. Human development index put by United Nations puts Kenya at the 147. The capital city Nairobi plays a central role in Kenya's economic profile.
Land stretches from Indian Ocean in the East to top of the Mount Kenya which 5,199 meters. gradually the altitude changes from the coast through the coastal belt and plains 152 meters above sea level and the Kenya Highlands over 900 meters above sea level.
In the low belt the terrain has residual hills, masses of broken boulders and inselbergs.
People inhabits where water can be found while the Wildlife found in the greater part of the low belt. The Amboseli Game Reserve and Tsavo National Parks are located here.

The Kenya Highlands is divided by the Great Rift Valley into east and west while was on the eastern side Mount Kenya. This Highlands are cool and agriculturally rich. Small and large scale farming takes place in the highlands.
Tea, coffee, pyrethrum, and wheat and corn are the Major cash crops and Livestock farming also take place.
Northern part of Kenya is plain and arid while Kano plains dominating lake Victoria Basin are suitable for farming through irrigation. Pastoralism is the main activity. Kenya is about 8-10 hours flying time from major European cities, and 16-20 hours flying time from North American cities
There are forty-seven counties in Kenya. Each of these counties has constituencies and wards. The population of each county is based on the 2009 Kenya census.

Under Kenya’s new constitution, there are the 47 counties of Kenya namely: Mombasa, Tharaka-Nithi.Samburu,Kakamega,kwale,Embu,Trans-zoia,Vihiga,Kilifi,Kituyi,Uasin-Gishu,Bungoma,,Machakos,Elgeyo/Marakwet,Busia,Lamu,Makueni,Nandi,Siaya,Taita/taveta, nyanda-
rua,Baringo,Kisumu,Garissa,Nyeri,Laikipia,Homabay,Wajir,Kirinyaga,Nakuru,Migori,Mandera,Muranga,Narok,Kisii,Marsabit,Kiambu,Kajiado,Nyamira,Insilco,Turkana,Kericho,Nairobi City, Meru, West Pokot and Bomet



Caption 1: Map of the 47 counties in kenya(Quide2kenya.com)

2.5.2 Climate

Kenya has tropical climate. The coast and temperate islands are hot and humid while North and North east parts of the country are very dry. The coastal town Mombasa has annual average temperature of 30.30 Celsius maximum and a minimum of 22.40 Celsius while the Nairobi-

capital city, Eldoret, lodwar and dry northern plain lands has a maximum and minimum of 25.20 and 13.60, 23.60 and 9.50 and 34.80 and 23.70 Celsius respectively.
The sunshine experienced throughout the year is plenty it is usually cool at night and early in the morning. Usually the months of April to June have long rains while October to December has short rains. The hottest period is from February to March while coldest in July to August.

Annual migration of wild beasts between Serengeti national park Tanzania and Maasai Mara national park in Kenya happens in June and September and is very important for tourism. It is estimated that about two million wildebeest, zebras and other species migrate and is considered the nature's spectacle on earth. The filmmakers worldwide has usually captured animal trek.

2.5.3 Natural resources

Kenya has natural resources such as limestone, soda ash, salt, gemstones, fluorspar, zinc, diatomite, gypsum, wildlife, and hydropower. Also oil which was discovered in Kenya in March 2012 by after exploratory drilling by Anglo-Irish firm Tullow Oil adds up to the above list. (BBC news Africa 26th march 2012)
More minerals are still undiscovered and search was ongoing.

2.5.4 Frequency of environmental catastrophes

The most common hazards in Kenya were weather related. These are floods, draughts, landslides, lightening/thunderstorm, wild fires and strong winds. These hazards have increased in number, frequency and complexity.
The level of destruction severity has increased thus more deaths of people and animals, loss of livelihoods, destruction of infrastructure among other effects resulting in losses of varying magnitudes.
More than 80% of Kenya's landmass in Kenya is Arid and semi-arid lands and support nearly half of the livestock population of the country and more than 30% of the total human population. These areas are prone to harsh weather conditions and hence making communities within this area vulnerable to natural hazard mainly draughts.

2.5.5 Drought

Drought was most prevalent affecting mainly Eastern, North Eastern, parts of Rift Valley and coast Provinces. The specific counties as currently referred to are: Baringo,laikipia, Turkana, Samburu,Narok, Kajiado, Marsabit and Isiolo, Mandera, Garissa, Wajir, Tana river, kilifi, Kwale and Taita-taveta. Most of these counties experience dry weather conditions causing pressure on the existing pastures and water resources of which the communities depend for

survival. Drought has been experienced on a cyclic basis with the major ones coming every ten years and the minor ones almost every three to four years. The 2004 drought is a replica of the previous cycle of severe droughts that affect the Country every decade as experienced in 1974, 1984 and 1994.

2.5.6 Floods

Floods affect many parts of the country seasonally especially along the floods plains of Lake Victoria and Tana River

There were specific areas that experience floods almost yearly. In Nyanza Province the affected areas were Kano plains, Nyakach area, Rachuonyo and Migori. In Western Province were Budalangi while In the Coast Province was Kilifi, Kwale and the Tana River Basin. In North Eastern province the areas affected were Garissa, Wajir, and Ijara the Urban Centers affected were Nairobi, Nakuru, Mombasa, Kisumu also the lower parts Tana River district experience floods as well.

Kenya was affected by floods following torrential rainfall and forces thousands of people living in the lowlands to move to higher grounds. The worst floods recorded were in 1961-62 and 1997-98.The floods during this season were associated with the El Nino phenomenon.

Landslides are experienced during the long rains season which runs from March to May. This happens mostly in Murang'a district and surroundings of the Mount Kenya region.

2.5.7 Landslides

Landslides and mudslides occur mostly during the rainy season and are accelerated by flooding .The most vulnerable areas are Murang'a, Kirinyaga, Nyeri, Kiambu, Thika, Maragua, Nyandarua and parts of Meru, located around mount Kenya region, Kisii and Mombasa counties.

"Mudslides have become more common in Kenya because so many forests have been cleared to make way for farmland. People have cut trees to cultivate, and the soil gets loose". This was according to Bonventure Wendo, the director of the National Disaster Operations Centre, which is mandated by the Kenya government to coordinate all activities, related to disaster management

2.5.8 Infrastructure

In the past decade, infrastructure contributed 0.5 percentage points to Kenya's annual per capita GDP growth.

In Kenya, More than 90 percent of the population has access to GSM cell signals. A successful public-private partnership in air transport has made Kenya's airline a top carrier in the region

and its international airport a key gateway to Africa. Institutional reforms in the power sector have reduced the burden of subsidies on the public by approximately 1 percent of GDP.
Kenya's infrastructure challenges are: doubling the capacity over next decade, improving the efficiency of operations at the Port of Mombasa, low levels of access to household services the power sector, underfunding of road maintenance, and negative progress on the Millennium Development Goals for water supply and sanitation (World Bank e library 2011)

2.5.9 Roads

Even though Kenya's road density indicators by some standards are relatively low, the trunk network length is more than adequate and provides basic regional and national connectivity. It provides important linkage capital to the coast, international border crossings, and to the 47 counties as currently called in the interior.Kenyas roads funding has sound funding system for roads mentainance and the country's road fund meets most of the good practice design criteria. There has been an institutional reform and above all the fuel levy was set at a level (around $0.12 per liter) adequate to fund the country's road (Africa infrastructure 2008)

2.5.10 Railway network

Kenya railway network is of strategic importance in the region because it links the port of Mombasa to Nairobi and continues into Uganda. It is conduit for bulk things, eases pressure and provides additional capacity along the northern corridor. The northern corridor links Kenya, Uganda, Rwanda, Burundi, and the Democratic Republic of Congo, parts of Tanzania, southern Sudan, and Ethiopia. As a result of deteriorated infrastructure, it handles less than 6% of cargo that passes it (Kenya's Infrastructure World Bank march 2011)
The Kenya railway concession is distressed and there is an urgent need the rail-port interface so as to decongest the port of Mombasa which handles more than 16 million tons of cargo annually and the number was projected to increase to 30 million tons by 2030(.Kenya's Infrastructure World Bank march 2011)
According to Kenya Railways Corporation projects, there were ongoing railway projects; the LAPPSET and Lamu Nadapal standard gauge railways.
When the long distance 3250km standard gauge railway project under LAPPSET complete will connect Kenya, South Sudan and Ethiopia and improve trade and investment in the region. (KRC 2014 Newsite, P.id 122)
While the LAMU –Nandapal railway will connect Kenya to south Sudan, Uganda, Rwanda, and Ethiopia. The project is expected to open up northern Kenya for exploitation of stranded resources and also provide landlocked countries of south Sudan and Ethiopia and with access to the sea (KRC 2014 Newsite,p.id 124)

2.5.11 Air transport

Kenya's international and domestic air transport infrastructure was relatively well-developed. Kenya has 3 international airports with the largest being Jomo Kenyatta international airport that serves more than 30 airlines and provides scheduled services to cities around the world. Kenya has a total of 230 Airports. Wilson airport which is the busiest airport in Africa handles light aircraft and general aviation (Encyclopedia of Nations)

Kenya is a regional leader in air transport with Kenya Airways being among the one of the Africa's top three international carriers.it has extensive network across the continent and a safety record up to international standards.Jomo Kenyatta International Airport in Nairobi has become one of the three main international gateways in Sub-Saharan Africa. Besides Kenya being an international hub, it has a domestic air transport market that is the fourth-largest in Sub-Saharan Africa following South Africa, Nigeria, and Mozambique (Encyclopedia of nations Kenya)

Three airports handle international flights namely: Nairobi's Jomo Kenyatta International Airport (JKIA), Mombasa's Moi International Airport (MIA), and Eldoret International Airport. Other airports include Wilson in Nairobi, Malindi, Kakuma, and Kisumu, and numerous airstrips throughout the country. JKIA is under upgrade with key objective to win category one status from the U.S. Federal Aviation Administration to allow for direct flights between JKIA and U.S. airports. Direct flights would boost tourism and trade and secure JKIA's status as a regional hub (mongabay Kenya transportation and telecommunications)

To increase airports capacity, infrastructure expansion works were going on at the major airports aimed at increasing the capacity.

Ongoing infrastructure expansion works to the major airports are aimed at increasing capacity.

2.5.12 Port

Mombasa is Kenya's principal seaport and acts as the main sea outlet for both inland Kenya and the land-locked countries of East and Central Africa. They include Uganda, Rwanda, Burundi, the eastern Democratic Republic of the Congo, and southern Sudan. The Kenya Ports Authority (KPA) which was created in 1978 manages port operations at Mombasa, as well as inland container depots in Nairobi, Eldoret, and Kisumu. The KPA also has jurisdiction over the small ports of Lamu, Kiunga, Kilifi, Malindi, Funzi, Mtwapa, Shimoni, and Vanga. Mombasa is a deep-water port with 21 berths that can handle all sizes of ships and 300,000 containers per year. Freight handled through Mombasa jumped by 12.6 percent in 2003 to 14.3 million tons, but inefficiencies, corruption, and deteriorating infrastructure at the port continue to be cited as a major deterrent to business in Kenya. There are plans to refurbish some of the port's equipment (mongabay)

Mombasa port is among the largest and busiest ports in Africa as well as the second-largest port in Sub-Saharan Africa after Durban in terms of tonnage and containers handled. It is key trading centers for the East Africa region with Dar es Salaam. The port is also a natural transshipment center for East Africa. However, Mombasa is straining to maintain that role because of significant capacity constraints. In terms of performance indicators Mombasa is doing relatively well compared with other ports in eastern and southern Africa. However, its container crane productivity, at 10 containers per hour, is far behind Dar es Salaam with 20 and Durban with15 (Kenya's Infrastructure World Bank march 2011)

Note that the Kenya government together with South Sudan and Ethiopia are undertaking a second transport corridor called Lamu Port –South Sudan –Ethiopia Transport (LAPSSET) Corridor. The project is composed of port, railway line, oil refinery, oil pipeline, airports, Highway; and Resort Cities. The mainly aims at enhancing Kenya's position as a gateway and transport hub to the East African Sub-region and the Great Lakes Region, Establish a reliable access to the sea for Northern/Eastern parts of Kenya, South Sudan and Ethiopia, and Facilitating trade, regional economic integration and interconnectivity between African countries namely; Ethiopia, South Sudan, Rwanda, Democratic Republic of Congo (DRC), up to Douala in Cameroon. (Ministry of transport, Kenyan embassy diaspora)

2.5.13 Electricity

Kenya power and lighting company (KPLC)provides mostly electricity services in the country.82.74% comes from hydroelectricity therefore power outages and blackouts have become common as a result of chronic draughts for instance between 1999 and 2000,Kenya experienced its worst draught in 40 years.KPLC therefore introduced power rationing in July 2000.(Encyclopedia of Nations)

2.5.14 Environmental issues and effects of climate change

The impact of drought has been increasing in severity for the past four decades. This has been associated with degradation of environment which has been taking place as a result of urbanization, development, extension of agricultural land into forests and logging of trees to burn and sell charcoal for economic gains.

The Wild fires have played a big role in environmental degradation by making the areas even more vulnerable to drought as the vegetation is depleted. This is as a result of the high Temperatures experienced during the drought season.

Floods has led to Loss of livelihoods including destruction of crops, death of farm

animals, destruction of settlements and houses, destruction of infrastructure mainly roads, telecommunication lines, power lines and Erosion of productive layers of the soil rendering the soil less productive.

Landslides tend to burry all that is their way and hence loss of life, agricultural land and crops as well as destruction of infrastructure resulting in destruction of life and property. (UNDP)United Nations Development Program, Enhanced Security Unit 2009)

2.6 Legal factors

Kenya's legal system was partially adopted from colonial past with its basis from English common law and with a combination of traditional customary law and elements of Islamic law on marriage and succession. On 27th August 2010, Kenya adopted a new constitution with agenda of reforms for better governance and way democratic stability. Business enterprises that can be started are limited companies of various form, partnerships and branch office registrations and partnerships.

Trusts are also recognized by law as well statutory protections intellectual property rights exist. Land Registration Act, the Land Act and the National Land Commission Act are laws on land issues while principles statutes that govern business and commercial areas includes insurance Act, the companies act, the Kenya communication act, the banking act, capital markets act, the transfer of business act, investment promotion act, the environmental management and coordination act, transfer of business act, the arbitration act, the trade marks act, competition act, retirement benefits act and statues that provides for land titles such as leasehold and freehold.

Kenya court system four tier one; magistrates, high court, court of appeal and Supreme Court. Although there have been criticisms of judicial proceedings as slow, inefficient and a time tainted with corruption, it is important to note that attempts were ongoing to reform and transform the judiciary to make it transparent and increase efficiency. (kaplanstratton.com Kenya business environment)

Kenya's president Mr. Mwai kibaki while addressing the delegates during the High Level meeting on the rule of law at the National and International Levels at the UN General Assembly in New York, U.S.A assured the international community that Kenya was committed to playing its part in promoting the rule of law throughout the world and especially in the East and Horn of Africa region. Stressed that in the past two years, his government had worked strenuously to implement the new Constitution that Kenyans adopted in the year 2010 adding that far reaching legal, institutional and administrative reforms have been implemented to strengthen the rule of law in Kenya (statehouse Kenya news sept 2012)

2.7 Culture and business culture

Kenya's culture is mixture of Western, African as well as Arab cultures. It actually has one of the most diverse culture setup in the whole of east Africa. Though most of cultures dominating the Kenyan cultural landscape are African customary practices because the country's population is dominated by 40 plus indigenous tribes, Asian as well as Arab cultural influences. Also coastal strip is dominated by Muslims who are mostly of Arab descent. There is a religious mix which with a Christian majority and indigenous minorities.

2.7.1 The Language

Kenya is a multilingual country but the official languages are Swahili and English although Swahili is popularly spoken. According to ethnoque, there are a total of 62 languages spoken in the country. They mainly consist of tribal African languages as well as a minority of Middle-Eastern and Asian languages spoken by descendants of foreign settlers such as Arabic, and Hindi. The African languages come from three different language families; Bantu languages which is spoken in the center and southeast, Nilotic languages spoken in the west, and Cushitic languages spoken in the northeast (kwintessential global etiquette Kenya)

2.7.2 The Kenyan people

Kenya is non-homogenous country by ethnicity since it is made up of 13 ethnic groups with an additional 27 smaller groups. The majority of Kenyans belong to 'Bantu' tribes such as the Kikuyu, Luhya and Kamba. There are also the 'Nilotic' tribes such as the Luo, Kalenjin, Maasai and Turkana. The 'Hamitic' people include the Turkana, Rendille and Samburu. Around 13% of the population are of non-African descent; Indian, Arab and European. (Kwintessential global etiquette Kenya)
Kenyans are strongly affiliated to their ethnic groups/tribes and family is very important than anything else. Generations live together in one house with all family members taking care of each other. Majority of the populations are Christians which are mainly Catholics and Protestants while Muslims are minority.

2.7.3 Time

Kenyans have more relaxed approach towards time but currently there is a growing punctuality trend and observing datelines. Punctuality tends to be observed while dealing with foreigners the business hours are normally from 9.00am to 4pm with one hour lunch break between 1 pm and 2pm.some business operates on Saturday morning. The main language used in business environment is English and basic knowledge of Kiswahili will be of great help.

2.7.4 Company hierrachy

Companies are clearly defined in Kenya especially the ones owned by families. The final decisions are made by top management but the employees get the opportunity to give their suggestions. Education and experience are considered the main source of credibility. Foreigners tend to be treated with a lot of respect because of international expertise.Collegues tittle and their place in company should be considered. Decision making is made top-down basis. Those in higher positions always have final say.

2.7.5 Communication style

There is protection of face hence its not norm to have a direct and frank communications until when relationship has been build
While making a point, metaphors, analogies and stories are commonly used and thus Kenyans are uncomfortable with blunt statement. Criticisms should be done in private and in circumspect manner. Gestures are used while making some emphasis. Kenyans control their emotions and expect others to do the same so as to maintain honor and dignity. They expect their business partners to inquire about their families before business discussions. (Kwinessential global etiquette Kenya)

2.7.6 Meeting and greetings

Kenyans mostly use handshake during greetings and a prolonged hand shake can be applied with person/people you have close relationship. Close female may hug and while greeting an elder person/someone of higher status, grasp the right wrist with the left hand while shaking hand a sign of respect. Muslim men/women do not always shake hands with men/women. "Jambo" is a common greetings meaning how are you? And is used immediately after hand shake. Questions about health, their families, business or more are asked after hand shake. While addressing people, use academic, professional followed by his/her name
Kenya is a polychromic society therefore business practice focuses on getting things in order of priority rather than using time schedule. Sometimes working schedules are halted for Muslims to pray (kwintessential Global etiquette Kenya)

2.7.7 Business Meetings

The meetings schedules can be structured or not depending on the ownership of the company. British or Indian owned companies use and follow agendas.
Relationships are important in Kenya so devote time to small talk in order to get to know your

hosts and vice-versa. It is prudent to allow your Kenyan hosts determine when it is time to begin the business discussion. Meetings rarely have scheduled ending times since what matters is finishing the meeting in a satisfactory manner to all concerned. In fact, Kenyans are amused at the concept of an ending time, since they believe the meeting only ends when all parties are finished.
Kenyans value tradition. Therefore, it is a good idea to provide a historical framework or context when attempting to introduce a new idea or process. They may ask questions until they feel comfortable and are able to proceed satisfactorily. (Kwinessential global etiquette Kenya)

2.7.8 The business attire

Kenya business attire is formal. The men wear suit and a tie while women wear long dress or skirt which reaches the knee. The women don't wear trousers although trend is slowly changing. Women should cover their shoulders and ensure that they don't wear anything too revealing. Business cards are used and should be given and received with both hands.
Therefore in a nut shell, shake hands with your collogues before starting the discussion, look at the people in the eyes while addressing them and you can invite your colleague for dinner for network,
It is of great importance to ensure that you don't raise your voice unnecessarily nor confront a colleague directly about a problem but rather use intermediary and finally don't show too much emotion in public environment.

2.7.9 The Role of the Family

Social structure is based on extended family where the relatives on both sides of the family as well as close friends are included .The husband's parents commonly live with the nuclear family when they get older and can no longer care for themselves. When people marry, they join their families, thus ensuring that there will always be a group to turn to in times of need (kwintessential global etiquette Kenya)

2.7.10 Giving of gifts

Generally, Kenyans give gifts for events of significance in a person's life or days of religious significance. They need not be expensive but practical gifts are preferred and therefore small gifts to servants, trade people and service workers at Christmas are customary. If you are invited to dinner at a Kenyan's home, bring pastries, flowers, or sweets for the hostess. Alternatively In rural areas, gifts of sugar or tea are quite common. Gifts should be nicely wrapped and there is no prohibition concerning the color of paper. Do not bring alcohol unless your

hosts drink. While giving thee gifts, it is using the right hand only or both hands and never the use the left hand (kwintessential global etiquette Kenya)

2.7.11 cultural dimension according to offstede

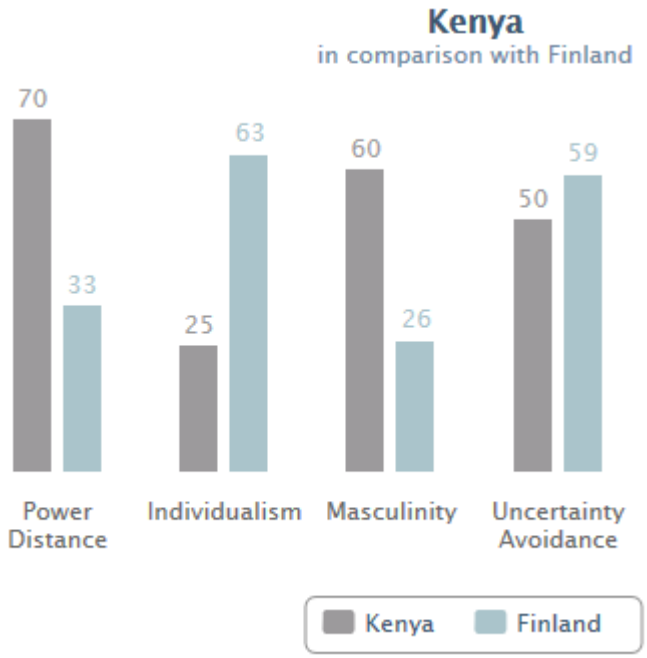


Figure 12:cultural dimentions(Geert holfstede.com)

2.7.12 Power distance

Power distance is defined as the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally. (Geert Hofstede.com/Kenya) Kenya scored 70, a score which is high and thus it means that Kenya is hierarchical society Whereby organizations are seen as reflecting inherent inequalities, centralization was popular, subordinates expect to be told what to do and the ideal boss is a benevolent autocrat.

If compared with Finland, the Finnish people have low power distance and hence they are independent and hierarchy was for convenience only. Finish society advocates for equal rights and superiors are accessible and have coaching leader while management facilitates and empowers. They have decentralized power and managers count on the experience of their team members. Employees expect to be consulted while Control is disliked and attitude towards managers are informal and on first name basis. Communication is direct and participative.

2.7.13 Individualism

The fundamental issue addressed by this dimension is the degree of interdependence a society maintains among its members and people´s self-image is defined in terms of "I" or "We". "I"for individual society and "We" for collective society (Geert Hofstede)

Finland has an Individualistic society and therefore preference is high for a loosely-knit social framework. Individuals are expected to take care of themselves and their immediate families only. In individualistic societies offence causes guilt and a loss of self-esteem, the employer/employee relationship is a contract based on mutual advantage, hiring and promotion decisions are supposed to be based on merit only, management is the management of individuals.

2.7.14 Masculinity / Femininity

High scores indicates masculine dimension whereas lower scores indicates feminine dimention. Mascuine dimension shows that the society is driven by competition, achievement and success. The winner or the best in the field defines the winner. Feminine score means that the dominant value in the society is caring for others and quality of live in the society. I n Feminine society, success is determined by quality of life.
The main issue issues such as wanting to the best (masculine) or by liking what ones does (feminine)

Kenya scores 60 in culture dimension and therefore the measure were high meaning Kenyan has masculine society. The behavior at work, school and play was where the people struggle to be the best and the winner takes it all. Achievements and success in the society makes them proud and thus this make the basis for hiring and promotions at work places and while solving conflicts they are done at individual level.
On the contrary, Finland exhibits a feminine society with a score of 26(Geert Hofstede.com/kenya)

2.7.15 Uncertainty avoidance

Uncertainty avoidance is the way the society deals with that the future can never been known.so the extent at which members in a culture feel threatened by unknown or ambiguous situations and have managed to create beliefs and institutions that try to avoid this was b reflected in UAI score.

The intermediate score of 50 indicates that Kenya has no clear preference in this dimension while Finland scored 59 meaning that Finnish society has medium high preference for avoiding uncertainty (Geert Hofstede.com/Kenya)

2.7.16 Long term orientaation

Kenya scored 25 while Finland scored 45.The Finnish culture scored 45, making it a short term orientation culture. Societies with a short-term orientation generally exhibit great respect for traditions, a relatively small propensity to save, strong social pressure to "keep up with the Joneses", impatience for achieving quick results, and a strong concern with establishing the Truth that normative.
Though both countries have short term orientation, Kenya is lower than Finland.

3 Energy markets in Kenya

Petroleum and electricity dominated energy sector in Kenya while wood fuel giving basic energy needs for the rural population, urban poor and the informal sector. Despite government efforts electricity connection was still low at 15 percent .In 2022 it's targeted that the electricity connection should have reached 65 percent. Analysis indicates that there heavy dependency on wood fuel and other biomass at about 68 percent of total energy consumed. Petroleum takes 22%, electricity 9% and others 1 %(Energypedia info Kenya 19.4. 2014)

3.1 The general energy situation in Kenya

The Kenya installed capacity was 1.48GW of which hydro power and thermal comprised of 57% and 32% respectively while the solar pv and wind power contributed about 1%.
The capacity connected electricity to the grid was approximately 1,429.The major source of electricity supply was from hydro and fossil fuels.

52.1% of the energy mix in Kenya was from hydro. Fossil fuels whereas geothermal, biogas cogeneration and wind contributed 32.5%13.2%, 1.8% and 0.3% respectively.
The demand for electricity was 1,191MW and was projected to grow to 2500 MW by the year 2015 and 15,000MW by 2030.Hence the installed capacity needed to be increased gradually to 19.200 by the year 2030.Majority of people in Kenya used biomass fuels and hence charcoal, firewood, paraffin and LPG were the main source of cooking fuel. About 68.8% households nationally used firewood as the main cooking fuel. And in the rural areas, about 90% use firewood while charcoal were mainly in the urban areas and thus 82% of urban households use it as compared to approximately 34% of households who use it in rural areas. Kenyans consumed 2.4 million tons of charcoal every year; according to survey of 2004/2005 every and about

200,000 producers produced 1.6 million tons of charcoal. Educational institutions such as primary schools, secondary schools and colleges were among the charcoal users. Rise in petroleum prices contributed towards the use. About 15% of the National populace use electricity for lighting.in urban areas, 42% of the people used electricity as compared to the rural areas where kerosene was still the main source of lighting at 87%.
In 2007, energy sector contributed was 20% to the overall tax. The cost for connections was ksh.35, 000 and about 0.1145 EUR per kWh of electricity.
Major obstacles to electricity expansion was the high costs involved especially to low income households and small businesses (Energypedia info Kenya 2014)

3.2 Industry structure and needs for energy.

The leader in national grid generation was Kenya Electricity Company (Ken-Gen).
Distribution of electricity was the duty of Kenya power and lighting company (KPLC) whereby it purchased power in bulk from Ken-Gen and IPPs.
Kenya Electricity Transmission Company Ltd (KETRACO) on the other hand was fully owned by Government plans, designs, and construct, own and operate and maintain high voltage of 132V and above. In order to accelerate development of geothermal in Kenya, the government formed Geothermal Development Company Ltd (GDC)
Six Independent Power Producers (IPPs) at the time and they contribute about 30% of effective generating capacity to national grid. Additionally, the Energy tribunal resolves disputes within the energy sector

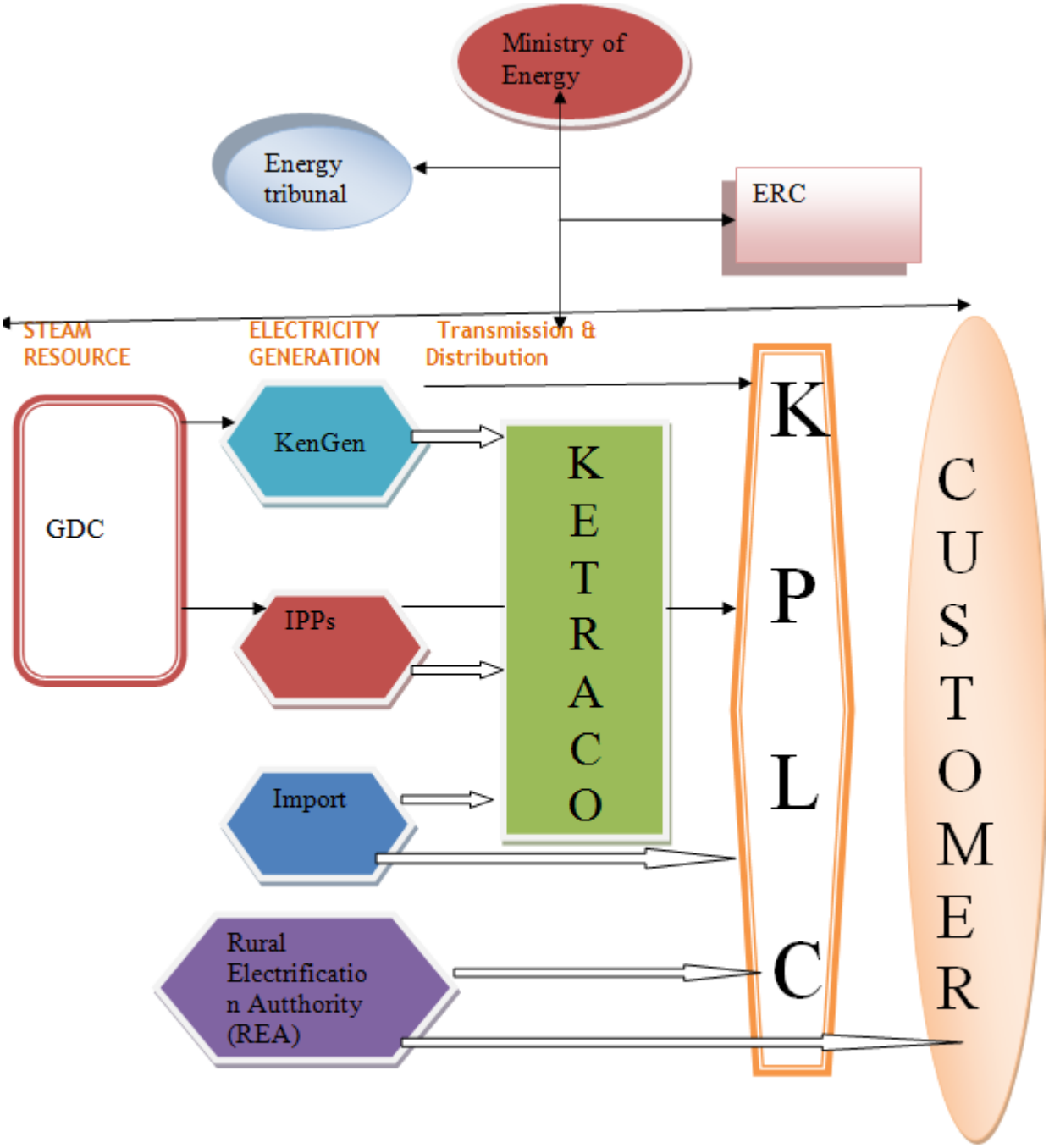


Figure 13: Industry structure and needs for energy

3.3 The supply and demand of energy

There has been substantial increase in energy demand in Kenya estimated at 7 percent per year for six years (Ajodhia, Mulder, and Slot, 2012).

The generation of electricity has not been able to keep up with the increase in demand even after improvement in access rates and increased capacity hence power continues to be a constraint on growth. Kenya depends heavily on hydropower for electricity generation, which accounts for over 56 percent of installed capacity, while thermal and geothermal energy sources account for 31 and 13 percent respectively (IMF subsidy survey in Kenya 2013, 89)
According to ministry of energy estimates, Electricity demand was 1,191 MW as compared to the effective installed capacity under normal hydrology which was 1,429 MW. The generation capacities for Geothermal, bagasse and wind were 52.1%, 13.2%, 1.8% and 0.4 % respectively. The fossil based thermal contributed at 32.5%.
By 2015, the peak load was expected to be about 2,500MW and 15,00MW by 2030.For the demand to be met, the projected installed capacity should be increased gradually to 19,200MW by 2030. (Ministry of Energy, STREP 2010)
Demand of electricity has been rising significantly in the country mainly due to increased productive investment and increasing population.

3.4 Investments and investors in energy

Despite availability of renewable energy sources in Kenya and the Feed-In-Tariff in place (FiT) policy in place, the real investments in the sector remained relatively small (Energy Regulatory Commission 2014)
Kenya imports about 30MW of hydroelectricity power from Uganda to serve western part of the country In order to try and meet its energy demands.
It also has an agreement with Ethiopian on a deal to import 400 megawatts (MW) at US$0.07 per kilowatt hour. The Construction of the interconnector was expected to take place from early 2013 by French Development Agency and African Development Bank and end by 2016 at a cost of US$1.2 billion. The project was to be financed by World Bank. The government of Kenya was making an effort to increase its installed electricity from current 1,394MW to 3, 868MW by 2016.
Ethiopian supply was to be fed into the national grid, making it available country-wide as country's effort to chronic power shortage push the country to adopt more expensive thermal power, thus fuelling high consumer prices. Hydro-power accounts for more than half of power generation in Kenya, followed by thermal and geothermal sources.
The World Bank was supporting a large scale geothermal plant in olkaria for a tune of $330-million to produce 280megawatts.It was part of an ambitious plan by both the Kenyan government and its partners to expand electricity access aimed at connecting 1.5 million people and businesses to the electricity grid by 2015(World bank renewable energy 2013)
Additionally, the world was supporting another large scale renewable energy project in Kenya. For the expansion of Olkaria plant by 280 megawatts, International Development Association agreed in 2010 to fund the project to a tune of $330-million on credit. This project was

part of Kenya's government and multiple partners to expand access of electricity by connecting 1.5 million people and businesses as well to electricity grid by 2015 at a cost of $1.4 billion package.
There was also another plan for wind project in loyangalani District, Marsabit County at Lake Turkana which was expected to produce 300 MW.The Lake Turkana wind consortium (LWTP) was to be the largest single private investment in Kenya's history. The wind farm was expected to be operational by 2016 (Lake Turkana wind power 2013)

3.5 Foreign trade related to energy

According to Kenya's Vision 2030 blueprint, Kenya strives to attain middle income status by 2030 and that access to electricity must expand from a national average of 30 percent to 70 percent. The investors both from domestic and overseas were convinced that with rapid economic growth, Kenya had the potential to convert into a hub for renewable energy accessories.
Kenya government through ministry of energy reached agreement with Ethiopia's Ministry of Water and Energy to import 400 megawatts (MW) at US$0.07 per kilowatt hour.
Kenya also imports 30MW from Uganda and this only serves Western Kenya. Due to the rapidly expanding market for solar panels, the overseas companies are positioning themselves to grab a slice of the pie in Kenya. For instance the German and Chinese manufacturers of solar panels have expressed willingness to enter the Kenyan market as demand for cleaner sources of energy surges. Kenya, like other fast growing economies in Africa, was a major market for solar panels. It is a frontier market that should invest in solar energy to bridge connectivity," said Benjamin Yu, the manager of the marketing department at Chinese firm Suntech Power Holdings (Expogroup/power energy Africa 2013)

3.6 Availability of maintenance services regarding energy / renewable energy sector

Several maintenance and repair services companies exist in Kenya in which most of them majorly deal with solar energy. Some of them do training to the users on the use of the appliances. (Energy source guides Kenya 2014)

3.7 Availability of energy, energy grids, outages

According to the International Monetary fund (IMF) case studies on energy subsidy reform on Kenya in January 2013,World Bank enterprise survey indicated that power outages led to losses that amounted to 5 percent of annual sales for the firms surveyed and 65% of firms in Kenya owns a generator. The Kenya Association of Manufacturers representatives pointed out that power disruptions continued to affect their operations, despite a provision that prices

charged by KPLC to its customers incorporated a requirement that system losses cannot exceed 15 percent.Briceño-Garmendia and Shkaratan (2011a) present estimates that suggested that unreliable electricity supply reduces Kenya's GDP growth by 1.5 percent per year. (IMF energy subsidy reform 2013)

3.8 The role of government and other stakeholders

The Ministry of Energy was in charge of development and implementation of energy policy and the Ministry also was partly responsible for the operation of the state-owned utilities in the country and the Rural Electrification Program. The Renewable Energy Department which was under the Ministry of Energy had been mandated to promote and developed appropriate renewable energy technologies as well as lead role in renewable energy policy formulation, review and analysis.

Energy Act for 2006 creates energy Regulatory Commission (ERC) whose role was to regulate the energy sector. This act gave power the minister of Energy to promote various sources of energy which is finally sold to the consumers through the national grid. The minister also was empowered to develop and manage a comprehensive national energy efficiency programme by putting emphasis on reducing energy demand by sustainably using education projects and promotion of efficient, cost-effective appliances and technologies.

In order to reduce country's reliance on hydroelectric power, the Government was planning to offer incentives to private sector players venturing into geothermal generation. To attract the private sector, the governments was lowering the risks associated with the drilling of geothermal wells by using the Geothermal Development Company (GDC) which was to drill wells and absorb some of the costs that would be incurred by private companies. The Government was considering exploring nuclear energy to meet increased power demand.

The development and implementation of energy policy is undertaken by the ministry of energy (MOE) as well as being partly responsible for the operation of the state-owned utilities in the country and the Rural Electrification Program. Renewable energy department in the ministry promotes and develop appropriate renewable energy technologies. It also plays a leading role in renewable energy policy formulation, review and analysis. Rural Electrification Authority (REA) under the Energy Act 2006 was mandated to develop and update the rural electrification master plan and promote the use of renewable energy sources.

Energy regulation was done by the Energy Regulatory Commission (ERC) effective from 7th July 2007 under the gazette notice. ERC functions are the economic and technical regulation of the electric power, renewable energy and downstream petroleum sub-sectors.ERC was mandated to regulate renewable energy sector amongst other forms of energy. Feed-in Tariffs (FiT) policy was published by the MOE with associated regulatory measures and price incentives for biomass-based co-generation, wind and small hydro in the first half of 2008.The policy stipulates the Price where Kenya power and lighting company (KPLC) should buy elec-

tricity generated from renewables hence under the January 2010 revised policy solar, geothermal and biomass energy can receive a guaranteed price for power generated. The Feed-in Tariff policy had limited financing implications since it did not imply direct subsidies. The Power purchase agreements for the technologies durations having recently been extended to 20 years.

Therefore Energy Regulatory Commission Regulate all forms of energy, Protect stakeholder interests, Maintain a list of accredited energy auditors, Ensure principles of fair competition are adhered to, Provide information to Minister when required and Collect and maintain energy data and prepare a national energy plan. On the other hand, The Ministry of Energy was responsible for overseeing the actions of the ERC, without direct involvement. The ERC is responsible for aiding the Ministry in the formulation of national energy policy with statistics and information as necessary (Reegle clean energy portal Kenya 2013)

3.9 Local energy policy and incentives schemes (taxation and subsidies)

The Sessional Paper No. 4 of 2004 and Energy Act of 2006 were the policy and legal frameworks for energy development in Kenya respectively. Through these, the Government was committed to promoting electricity generation from Renewable Energy Sources (RES). In addition, a Feed-in-Tariffs (FiT) Policy has been formulated to promote RES and improve the rating of Kenya's renewable energy sector as an attractive destination for substantial private sector investment. Under the FiT system, investment security and market stability for investors in electricity generation from RES is provided whilst encouraging private investors to operate their power plants prudently and efficiently to maximize returns. This will facilitate the exploitation of the abundant RES available in the country. The FiTs were introduced in 2008 and revised in 2010 to accommodate additional RES and reviewed the tariff prices.

The Government had zero-rated import duty and removed Value Added Tax (VAT) on renewable energy, equipment and accessories. The ERC has prepared Solar Water Heating Regulations. These steps are intended to mitigate the challenges faced in exploiting the solar energy resource. (Reegle clean energy portal Kenya)

In order to reduce country's reliance on hydroelectric power, the Government had planned to offer incentives to private sector players venturing into geothermal generation so as to attract the private sector. The government planned to lower the risks associated with the drilling of geothermal wells by using the Geothermal Development Company (GDC).GDC was expected to drill wells and absorb some of the costs that would have been incurred by private companies.

According to Bernard Osawa Director Renewable Energy - Energy Regulatory Commission of Kenya during 3rd International Conference of the African Renewable Energy Alliance on Renewable (Energy Policies and Gender) on June 29, 2011, Abuja- Nigeria, and Energy Policy aligned to long term development strategy Vision 2030 and other policies.The energy Act of

2006 was restructured, least Cost Power Development Plan which is Integrated power planning, rural electrification master Plan ;a roadmap for rural electricity expansion,Kenya National Climate Change Response Strategy (2010) ;Carbon neutral energy development plan and Making policy happen which has alignment and tools (Reegle info Kenya 2013).

3.10 Current situation and outlook of renewable energy market

1. According to the world trade organization, Kenya had the largest private sector which was dominated solar PV home systems market in a developing nation. It also has an annual growth rate of 10- 20% in recent years. Overall installed capacity of renewable sources has increased on average 5% per year since 1980, on par with overall increases

3.11 Supply: structure of renewable energy industry

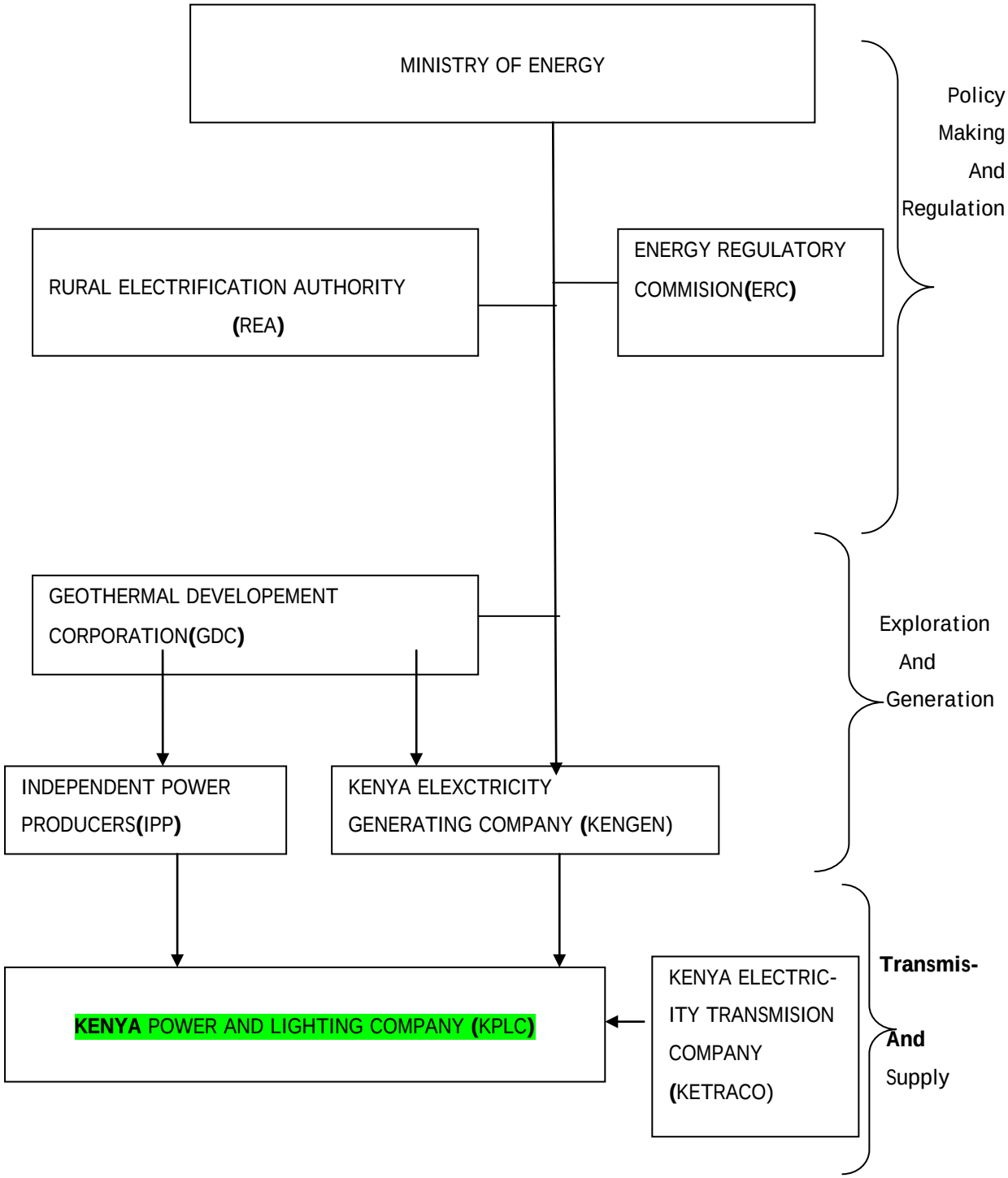


Figure 14:structure of renewable energy industry(enabling kenya private sector participation in electricity generation pdf)

Kenya Power is a limited liability company which transmits, distributes and retails electricity to customers throughout Kenya. KPLC is still partially privately owned with which the largest shareholder is the government of Kenya with a stake of 40.4 per cent (KPLC, 2009). For this reason, the company is considered a parastatal or state-owned enterprise, and it is subject to the requirements of the State Corporations Act of 1987 (as Revised in 2009), which governs state-owned enterprises in Kenya(enabling private sector participation in electricity generation pdf Kenya p.3)

3.12 Demand: main buyers and procedures

The main buyers are the households, commercial and public services, traffic and transportation, agriculture, industry and tourism.
Households needs heat for cooking, warming water and power for lighting, communication and electronics. Commercial and public services needs power, heat and fuels and comprise of education, HealthCare and business, administration. On infrastructure, energy is needed for water supply, sanitation, waste management and communication. Energy generally is needed for power, cooling, heating, and lighting or as fuels.

3.13 Challenges, constraints in market entry in technology in renewable energy in the market

Despite war against Corruption in Kenya there have been documented many cases of corruption especially in the procurement and tendering both in the government and private sector.
Poor infrastructure- Kenya like most developing countries doesn't exactly have the best roads and communication structures in place, but they are slowly improving this has made the cost of operations to be slightly higher.
Bureaucratic procedures of registration-there are many legal technicalities to over-come from licensing to registration to permits. Besides increasing the cost of doing business this procedures and documents are time-consuming since they are not under one roof and take time to be processed into completion
Lack of sufficient information. To start a business it is good to have facts right or else you may get disillusioned by issues halfway into the venture. Take your time to identify any possible opportunities and threats in business.
Cultural barriers was considered as one of the challenges.one has to understand the local culture so as to be able integrate into the local business environment successfully.
Competition with already established companies will be a challenge because they already have established a customer base and build loyalty with its customers.

Regulatory barriers for examples FiT Policy does not enjoy the same level of protection that an Act of Parliament enjoys. .For example if a policy does not have significant political support, it could be changed, put on hold or scrapped altogether (Reegle info Kenya energy 2013) According to institute of economic affairs presentations at a workshop at the Stanley hotel in Kenya on 24th July 2013, the following were cited as challenges faced by the energy sector in Kenya.

Low supply has made it difficult for the country to meet its energy demand, Lack of major investments in the sector by the private sector,Affordability which is the impacted on the competitiveness of the country as an investment destination,Weak transmission and distribution network which may lead high power losses, Frequent power outages, Low voltages contributing to high tariffs, Low connectivity rate and Vandalism and theft of transformers and power cables escalating the cost of maintaining electricity connections (Institute of economic affairs Kenya 2013)

3.14 Financing of renewable energy projects; existing plans

financiers of renewable energy project range from the govermenr of kenya to the private sector or public private partnership.

3.14.1 Public Finance

The Kenyan government by facility policy instruments such as Feed-In-Tariffs (FiT) 2008, Updated 2010 and 2012. Aim was to guarantee a technology based fixed price for the power feeding into the National grid and also provided income generating security to projects developers which they could use to get project finance. The aim of FiT was to oblige purchasing of generated power, to lower barriers for renewable energy interventions compared to conventional electricity generation and finally to facilitate sustainable market.

Also in 2012 the Government announced a plan to establish renewable energy fund to boost renewable energy generation. The programme was intended to lend to viable projects at concessional rates and provide trust fund for research and training and to develop projects proposals and the concessional loans were to be disbursed through commercial banks. (ERC/ Financing renewable energy in Kenya 2014)

3.14.2 Development Finance

International organizations support the Kenyan Government by providing funds for renewable energy. This was coordinated through Kenya joined assistance strategy (KJAS) which consist of 15 major development partners. Partners under KJAS includes: WORLD BANK, Africa Development fund(AfDB), and Agence Française De Development (AFD), European Investment Bank (EIB), United National Development Programme (UNDP), United Nations Environmental Pro-

gramme (UNEP), German Development Bank (KfW), Japanese International Cooperation Agency (JICA), United Stated Agency for International Development (USAID). Notable programmes include the Regional CDM capacity building project for sub-Saharan Africa; Development and Implementation of a Standards and Labelling Programme in Kenya with Replication in East Africa; Cogen for Africa; Greening the Tea Industry in East Africa; LGGE (Low Green House Gas Emission Buildings) Promoting Energy Efficiency in Buildings in Eastern Africa; and Eastern Africa Rift Geothermal Development Facility Project (ARGeo) among others.
(ERC/ Financing renewable energy in Kenya 2014)

3.14.3 Climate Finance

Kenya was among the selected as a pilot country under the Scaling-Up Renewable Energy Programmes in Low Income Countries Programme (SREP).SREP was started So as to scale up renewable energy solutions and expand renewables market in the world's poorest countries, Kenya among them. A technology supported by SREP includes solar, wind, bioenergy, geothermal and small hydro technologies.
Under the programme,Kenya has been allocated US$ 50 million and was to be used to expand geothermal development and mini-grid capacitities.STREP promotes public and private sector actions(ERC/ Financing renewable energy in Kenya 2014)

3.14.4 Commercial Finance

There are a large number of local and international banks in Kenya which may be interested in financing renewable energy projects. In 2006, Agence Française De Development (AFD) announced a project worth €2.6 million to provide technical assistance to renewable energy efficiency investment in Kenya, Uganda and Tanzania and an additional €30 million was availed as a line of credit administered through CFC Stanbic and the Cooperative Banks.(ERC/ Financing renewable energy in Kenya 2014)

3.14.5 Examples of financed projects

The World Bank Group is supporting a large-scale renewable energy project in Kenya which costs $330-million to expand geothermal power production at the country's Olkaria plant by 280 megawatts to effect the plan. The International Development Association (IDA) credit was approved in 2010 as part of a $1.4 billion package supported by both the Kenyan government and its partners (climate change World Bank 2013)
KenGen had already set up a 5.1-MW wind farm in Ngong on the southern outskirts of Nairobi and the company has plans to erect a second 10-MW wind farm in the area.It is estimated to

cost (Kes) 2 billion [about US $25 million] .while The African Development Bank pumped more than $400 million into what was set to be the biggest wind farm in Africa. The 300-MW wind farm was to be constructed in the northern frontier district of Turkana under the Lake Turkana Wind Power Company (LTWP) and was set to go online by July 2012.

According to Carlo van Wageningen the LTWP Chairman, the company intends to erect 360 wind turbines in northern Kenya each with a capacity of 850 kW. Kenya.LTWP a Dutch consortium that has leased about 70,000 hectares in Turkana to develop the wind farm. LTWP was to construct a 300-mile transmission line to connect the wind farm to the national grid. There were plans to expand the wind farm to increase generation capacity by 2,700 MW. According to the Nairobi-based United Nations Environment Program (UNEP)

Mumias Sugar Company (MSC), the largest sugar milling company in Kenya, is perhaps the best example of industrial green energy production in Kenya. The company has installed a 34-MW electricity plant that is fueled with byproducts from its sugar milling processes. It uses a portion of the energy it generates in its industrial operations and sells the rest to the national grid(Renewable energy world news 2010)

There has been low level of engagement in energy by the private funding market hence the Government of Kenya through the Rural Electrification Fund (REF) and in partnership with development partners, remains the largest financier of energy projects in Kenya. The Government has several bilateral and multilateral partners in energy projects, such as JICA, World Bank, Chinese Government, USAID, IFC and others. There are several actors, however, involved in energy financing at both small project and pilot levels. They include:
Financiers of Non-Governmental Energy Initiatives in Kenya UNDP/GEF Small Grants Programme has supported several projects in the past, especially in partnership with NGOs (such as Sustainable Community Development—SCODE and Rural Energy Technology Assistance Programme—RETAP).
A UNEP/GEF/AfDB initiative is currently supporting both the Greening Tea Project, for small hydro power, and Cogen for Africa Project, for cogeneration, implemented by the East African Tea Trade Association (EATTA) and AFREPREN/FWD, respectively.
GTZ, working in partnership with the Ministry of Agriculture, is supporting biogas sector capacity building and installation of pilot projects under the Private Sector Development in Agriculture (PSDA). This has led to the formation of the Association of Biogas Contractors of Kenya (ABC-K), involving local installers such as SCODE and Reecon.
The Global Village Energy Partnership (GVEP) has been supporting experience sharing and networking in Kenya. In March 2008, GVEP began implementation of an East African-wide initiative to building the capacity of local energy enterprise under a project named “Developing Energy Enterprises in East Africa Project” (DEEP-EA). GVEP has partnered with ITPower East-

ern Africa, Practical Action, Emerging Markets Africa,Aga Khan Foundation and the East Africa Technology Development Network.

Private sector funding mechanisms have been few and have come far apart. They include the Solar

Development Group, the IFC/GEF Photovoltaic Market Transformation Initiative (PVMTI), the Triodos Renewable

Energy for Development Fund, represented by local green finance consultants, Integral Advisory Limited. The World Bank's Development Marketplace (DM) competitive programme has also financed a number of energy related projects, such as Solar Ice. The Wuppertal Institute (Germany), is also active, with projects such as for institutional biogas, being promoted by ITPower Eastern Africa. The Shell Foundation has also supported household cooking energy access through the Breathing Space Project, in partnership with KUSCCO, KWFT and ITPower Eastern Africa.

Carbon finance is recently also gaining momentum in Kenya, with companies such as Mumias Sugar and Bamburi progressing towards sales of credits. Active private sector players include Environmental Cost Management Centre (ECM Centre) and ESD Africa (ESDA).

NGOs such as Practical Action and SACDEP have been active in energy projects at community level, especially in biomass-related household technologies. Other NGOs, for instance AFREPREN, have been supported by institutions such as Swedish Development Agency (SIDA) to undertake energy policy research.

The Ashden Trust has supported institutions such as Solarnet, whereas the IFC/GEF PV MTI project has supported the Kenya Renewable Energy Association. TRED Fund has also been instrumental in financing the core budget of KEREA since KEREA's formation. Recently, GTZ, too, is supporting energy sector associations (KEREA strategic plan 2012)

4 Aims, target groups and content (questions) of interviews

The main target groups was the government institutions in Kenya dealing with renewable energy already as well as the learning institutions, also the private sector and Finish companies which were engaged in renewable energy in Kenya. Most of the institutions contacted did not respond to my questionnaires even after earlier accepting to do so.Two main companies responded and gave detailed insights on the matter.FinPro and KenGen gave useful information on their experiences.

KenGen is a leading electricity generating company in Kenya and produce about 80 percent of electricity consumed in Kenya. It manages all the public power generating facilities in the country (KenGen 2014)

FinPro was established to improve the competitiveness of Finnish companies and to advance their internationalization.

Therefore FinPro was a good company to help with critical information since they know both Kenya business situation and Finland as well hence in good position to advice the Finnish SME's enter Kenyan market in renewable energy (Finpro annual report pdf 2013, 3)
The research questions were send out between January and July 2013.Margaret Irungu replied on behalf of KenGen in February 2013 and Finpro was represented by Henrik Reuhkala who was a company junior market analyst.
The questionnaire was as follows.

QUESTIONAIRE

1. How would you rate demand versus the supply of renewable energy solutions in Kenya?

2. What steps have the institutions of higher learning taken in preparations for achieving Kenya's vision 2030 on meeting the expertise demand in the country on renewable energy?

3. If foreign companies enter renewable business in Kenya, what target market would you propose?

4. Most universities and other institutions of higher learning uses electricity from hydro power, do you think that by adopting renewable energy power the institutions can lower costs as well as reliability?

5. Do the institutions of higher learning partner with renewable energy companies/providers in training professionals and preparing them for job market

6. What is the level of preparedness in terms of local expertise in renewable energy?

7. Now that oil deposit has been found in Kenya, do you think that it might affect renewable energy business in Kenya?

8. How can you rate the growth of use of the following renewable sources?

a) Solar power

b) Wind power

c) Biomass

c) Waste to energy

9. Do Kenyan universities have exchange programs on renewable energy courses with countries such as Finland with high technology?

10. Generally what is the future of renewable energy in Kenya?

4.1 Interview results

4.1.1 FINPRO

Finpro was the national trade, internationalization and investment development organization in Finland. It supports our clients' international growth and success by enabling them to be in the right markets at the right time with a competitive concept and offering.
Both locally and globally, Finpro networking benefits its clients and our partners. As well as carrying out assignments for companies, Finpro runs several major national projects, such as Cleantech Finland, Future Learning Finland and FinlandCare. (Finpro English pages)
The company response was as follows:
According to respondents Finpro, the renewable energy solutions which exist in the market already includes: Solar wind hybrid power for telecom masts (Winafrique), Solar heated water (solar collectors), many off-grid micro solar PV solutions: solar lanterns, solar cell phone Chargers.The wind power project by KenGen (5MW at Ngong Hills with plans to expand) and Planned 300MW project at Turkana,Geothermalpower +200MW by KenGen and independent power produces.Hydro power was discouraged because it was not reliable in Kenya due to unpredictable water levels that lead to electricity disruptions.Biomass (in this case wood) was of course used extensively as cooking fuel while biofuels were produced in very small scale. Ethanol production was on plan at the sugar plantations. Jatropha was being research as a source of biofuel and burning of bagasse (waste from sugarcane) produces quite a bit of electricity to the grid. For instance Mumias Sugar produced their own electricity by burning bagasse and sold the extra to the national grid.
The company was not aware of many players in the market but understands that competition within Small off-grid renewable energy solutions was fairly tough while on electricity production for the national grid was dominated by KenGen which owns a market share of approximately 80%.Finpro was not familiar with price levels but understood that the cheapest was the geothermal while the most expensive was thermal energy. On subsidies and tax reductions, the company was not aware if any but knew that there was a law in process which if it were passed would see all houses fitted with solar water heaters.The customers in the market were the Kenyan government (KenGen), UN and NGOs buy renewable energy solutions and also private individual for instance Safaricom had a few wind solar hybrid solutions electrifying their masts and One private company was in geothermal energy. It further noted that it guessed that prices mattered more than the quality. The respondent added that supply was

there, but demand has not picked up as new technology takes time to settle in so that people understand it and can trust it.Price was also an issue as some solutions require relatively high upfront costs. Even with the discovery of oil in Kenya, Finpro did not expect any effects on electricity price since mostly oil would be used by motor vehicles and that the oil benefits needed about 10 years to be realized. Renewable energy that was most unexploited was biogas and biofuels while geothermal then was growing faster while the solar was in the market already. The company also rated the growth of use of the following renewable sources that solar had room to grow, wind energy as uncertain because of lack of field for putting wind mills. While biomass was the most used for cooking and waste to energy as very little were used, biogas was been used on small scale. The future was promising and there were small Kenyan "green" solutions coming day by day and there were optimistism as well as positive signs here and there over renewable energy

4.1.2 Kenya Electricity Generating Company (KenGen)

This was the leading company in producing about 80% of electricity consumed in Kenya. It uses various sources to produce electricity such as Hydro, geothermal, thermal and wind. Hydro was the leading source with installed capacity of 766.88MW which was 67.9% of the company installed capacity. (kengen.co.ke)
The response to the questionnaire was as follows:
According to KenGen, the renewable energy solutions already in existence were: Hydropower, Geothermal energy, Wind power, and solar energy, Biogas, Biomass, Co-generation, and Biofuels. The competition was not tough because KenGen controls a market share of about 80 percent. Biogas and biofuels were done by private investors on small scale.Orpower and IPP has geothermal, while mumias sugar company did little co-generation of power. The prices were controlled by Energy Regulatory Commission although it was seen to be higher that other African countries such as Egypt.In terms of electricity, there are special tariffs called feed-in-tariffs for grid connected power. In others forms such as biogas and solar energy, tax exemptions on equipment were given by the Kenya Government. Renewable energy was sold on the open market just like other forms of energy. The Kenyan citizens were the customers but there were plans to interconnect with the Eastern Africa Power Pool in terms of electricity (Eleven countries).Energy Regulatory Commission regulated the energy market but efforts are being done to increase the liberation rate. The demand was higher than the supply.KenGen had a suppressed demand of about 30% in the case of electricity.KenGen needed a reserve margin of about 30% as per our long term National Strategy called Kenya Vision 2030. Oil was not going to enhance the portion of renewable energy for national strategic reasons. A sovereign oil fund was being discussed and this showed the awareness of the Kenya Government as regards the finite oil wealth compared to renewable energy. As regards electricity; most countries limit their wind and solar power component to about 30 to 40% while using other

firm power sources to stabilize the power grid. This meant oil could create more room for wind and solar power in Kenya. Among the renewable energy solutions, which were the most unexploited in Kenya were wind, solar, biomass, biogas and waste to energy. The ratings for the growth of use of the following renewable sources.solar power was rated as below average,wind power was slow,biomass as very high but not well managed and waste to energy as below average. Generally the future of renewable energy in Kenya was very bright. For example, more than 75 % of electricity in Kenya could come from renewable energy over the next 25 years

5 Renewable energy potential in Kenya

Kenya designed National Energy Policy so as to facilitate provision of clean, sustainable, affordable, reliable and secure energy services at least cost while at the same time protects the environment. The country's economic growth and energy demand was higher than ever. The electricity supply by then was increased slowly, but could not keep up with demand. Therefore the Kenyan government decided to use three policy tools to facilitate the adoption of renewable energy. The aim was to increase the country's energy supply, close the demand gap, and ultimately enable economic growth for Kenya. (Invested Development 2012)

5.1 Solar

Sunlight was defined as a renewable energy source. Solar panels convert sunlight into usable energy. Solar thermal panels use sunlight to heat water for washing and heating, while solar photovoltaic (PV) panels convert sunlight into electricity. (Edfenergy.com)
Kenya receives a high insolation rates with an average of 5-7 peak sunshine hours and also had the most active commercial PV system market in the developing world. There were about 4 million households in rural Kenya alone which present a vast potential for this virtually untapped technology. The off grid market was estimated to be over 40MW.concerning households; about 200,000 rural households in Kenya had solar home systems. This success was largely due to private sector activity. The high level of uptake has been through the sale of products that best fit the purchasing power of rural households, and by making these products available within the mobility range of potential customers, typically less than 40km from the customers home [Van der Vleuten et al, 2003] .(Energypedia info Kenya 2013)
The potential for solar energy in Kenya was high because Kenya receives daily insolation of 4-6kWh/m2. Solar was utilized majorly for photovoltaic systems (PVS), drying and water heating. The Solar PV systems were mainly for telecommunication, cathodic protection of pipelines, lighting and water pumping. The installed capacity by then was approximately 4 MW and about 140,000 solar water heating systems had been installed.

Young Kenyans were producing small solar panels In the Nairobi suburb Kibera. This generates enough electricity to operate a radio, and charge batteries or mobile phones and they sold them for $US5. The average income in Nairobi is around $US1 a day. An estimated 100,000 solar home systems have been installed in Kenyan houses. The majority of them consisted of a small 12-14 watt photovoltaic panel (Reegle energy portal)

According to Energy regulation Kenya, solar energy market development was vibrant and provided electricity to homes and institutions from the national grid and for medium temperature water heaters for domestic and commercial usage. A preliminary survey done in 2005 established that the annual market demand for Photo Voltaic (PV) panels was 500 kilowatt peak (kWp) and that was projected to grow at 15% annually.

The government programmme was started in 2005 to provide basic electricity to boarding schools and health facilities in remote areas increased the annual demand for PV panels by 400 kilowatt peak. Out of approximately 3,000 eligible institutions, 450 had been equipped with PV Systems with a combined capacity of 1,450 kilowatts peak in the last four years. Another 400 institutions are earmarked to benefit from installation of PV systems with a combined estimated capacity of 80 kilowatts peak. There is also the wider market provided by the other member states of the East African Community and COMESA. It was estimated that the initial market demand for PV systems was one megawatt peak, and presented a great opportunity to investors in PV panels manufacture.

Manufacture of associated components and accessories, such as charge controllers, inverters and PV batteries was another opportunity. (Energy regulatory commission 2013)

From 2006-2007, the Ministry of Energy had been actively promoting use of solar energy for off grid electrification and specifically funded the solar for schools programme and targeted to extend that to off grid clinics and dispensaries(Energypedia info Kenya 2013)

According to solar home guide Kenya, the growth solar energy use had been attributed to solar energy being cheap and reliable compared to electricity, and the fact that Kenya enjoys many hours of sunshine annually due to its location on the equator. In addition, solar lighting systems were easy to use and require little maintenance owing to the lack of moving parts. (Kenya homes guide/solar lighting in Kenya 2014)

Some of the barriers affecting solar energy exploitation included: High initial capital costs, low awareness of the potential opportunities and economic benefits offered by solar technologies, and lack of adherence to system standards by suppliers

The Government zero-rated import duty and removed Value Added Tax (VAT) on Renewable energy, equipment and accessories. The Energy Regulatory Commission has Prepared Solar Water Heating Regulations. These steps are intended to mitigate the Challenges faced in exploiting the solar energy resource (Updated SREP Draft_Investment_Plan_May_2011.p.4)

5.2 Wind energy

Kenya has low exploitation levels of wind energy with installed capacity of 5.1 MW at Ngong site operated by KenGen. They were plans by the company to erect a 10MW wind farm which was to be the second at a cost of about US $25 million.

The Feed-in Tariffs (FiT) Policy has been developed by the government in order to promote the resource. This policy was a fixed tariff which does not exceed US Cents 12.0 per Kilowatt-hour of electrical energy supplied in bulk to the grid for wind generated electricity. Lack of sufficient wind regime data and High capital cost are some of the barriers in exploiting this resource (STREP report 2011.p.4)

Kenya average estimated wind speeds was 3-10m/s and has about 300-350 wind pumps which had been installed in the country. 0.55 MW of wind power has been installed the private sector is being encouraged by the Government to set wind firms. (Reegle.com Kenya 2012)

Kenya has the potential for up to 3,000 MW of wind, especially in the wind-rich Northern frontier districts. Besides Kenya, only Morocco and Egypt have successfully tapped wind energy in Africa (Renewable energy world 2010)

5.3 Waste-to-energy

Kenya was in the process of utilizing wastes for energy. As a way to find solutions to waste and hyacinth challenges, the Ministry of Environment and Mineral Resources wanted to partner with the United Nations Industrial Development Organization (UNIDO) to carry out studies in Lake Victoria basin and Nairobi.

After consultative meeting with Indian team of energy experts, it was agreed between the Permanent Secretary in the Ministry by then Mr. Ali D. Mohamed and the UNIDO representative for Kenya and Eritrea Mr.Ola Attera for Nairobi and Kisumu stakeholders to use the technologies demonstrated by experts to utilize solid waste to create energy and water hyacinth to biogas and related products. Mr. Mohamed noted that the government would buy biogas units for demonstration to the public and other stakeholders so that it can attract Public Private Partnerships to address waste and energy needs (archives Kenya/environment 2013)

Caption 2: private public partnership(Think Africa press.com)

PS, MEMR, MR. Ali Mohamed in discussion with the Indian team of energy experts led by Prof. V.K Damodaran (white hair) on the start of their three day visit to Kenya.

Also With shortages of power and rising costs of fuels, Embu prison in Kenya started using human excrement to generate power The Bio-gas fuels three boilers in the prison kitchen, and firewood costs have been cut down by more than half. In order to generate power, human waste usually put into a machine called the "digester" and bio-gas produced by bacteria during a 30-day fermentation period. The gas, which consists mainly of methane was then captured and burnt as fuel. The water released from the final chamber can also be used for irrigation, cleaning, and, if treated, even for drinking (Think Africa Press Monday, June 21, 2012)

Caption 3: Embu prison in Kenya started using human excrement to generate power (Think press Africa.com)

Benjamin Kiprono and Francis Makathimo at Embu Prison. Photograph by Rachuonyo Duncan

5.4 Geothermal

The Geothermal resources in Kenya are located within the Rift Valley with an estimated potential of between 7,000 MWe to 10,000 MWe spread over 14 prospective sites. It was most suitable source for base load electricity generation in the country because its advantage was that rain does not affect as well as drought and climatic variability. It has the highest availability at over 95% and among green energy with no adverse effects on the environment
The current installed capacity in the country is 198 MW with 150 MW and operated by KenGen and 48 MW by OrPower 4, both in the Olkaria Block. An additional 280 MW, scheduled for commissioning in 2013, was also under development in the same block. Drilling was ongoing in the Menengai Field for Phase I of 400 MW, whilst initial project development activities had commenced for the development of 800 MW in the Bogoria – Silali Block. These are geared

towards meeting the Vision 2030 Medium Term target of 1,600 MW by 2016 and eventually 5,000 MW by 2030. (Reegle country clean energy portal Kenya 2013)

Caption 4: Olkaria Iv geothermal power plan(kenGen)

6 Relevant Authorities and other support organizations

Agencies that provide licenses and/or clearances for energy related projects include: The Ministry of Energy, The Kenya Power and Lighting Company, The Kenya Civil Aviation Authority, The National Environment Management Authority, The Ministry of Local Government, The Energy Regulatory Commission, The Water Resources Management Authority.
Other agencies which were also key in setting up renewable energy project are the Registrar General for information on Company Registration, The Ministry of Lands and Ken Invest. (ERC renewable energy portal Kenya 2013)

6.1 Government Authorities and Supporting Institutions in Kenya

6.1.1 Rural Electrification Authority (REA)

Under the Energy Act 2006, the REA is mandated to develop and update the rural electrification master plan and promote of the use of renewable energy sources. The authority reports to the Ministry of Energy.

6.1.2 Geothermal Development Company (GDC)

The Government Realized the need to reduce the long gestation periods in the development of geothermal projects and hence set up the GDC to undertake integrated development of geothermal through initial exploration, drilling, resource assessment and promotion of direct utilization. The GDC is 100% owned and funded by the Government. It undertakes the initial project activities thus absorbing the attendant risks associated with geothermal development and therefore open up opportunities for both public and private participation.

6.1.3 Energy regulator

The Energy Regulatory Commission which came into effect in July 2007, was formerly the Electricity Regulatory Board established (ERB) under the Electric Power Act of 1997. The ERC was responsible for the economic and technical regulation of electric power, renewable energy and downstream petroleum sub-sectors. Energy Regulatory Commission (ERC) is established under the Energy Act, 2006. The energy act became effective from July 7 2007, the Electricity Regulatory Board (ERB) became Energy Regulatory Commission (ERC) with the following objectives and Functions:-It regulat the electrical energy, petroleum and related products, renewable energy and other forms of energy,protect the interests of consumer, investor and other stakeholder interests,maintain a list of accredited energy auditors as may be prescribed, monitor, ensure implementation of, and the observance of the principles of fair competition in the energy sector, in coordination with other statutory authorities,Provide such information and statistics to them Minister as he may from time to time require; Collect and maintain energy data, prepare indicative national energy plan as well as perform any other function that is incidental or consequential to its functions under the Energy Act or any other written law.

6.2 Companies and renewable energy organizations in Kenya

Solar energy Companies in Kenya include-Energy Africa, Center for Alternative Technologies, Clean Power Kenya Limited, Properguard Systems and Electricals, Trusun Ltd, Chloride Exide, Kenital Solar, Solar Electro. Co. Ltd, Go Solar Systems Ltd, Davis & Shirtliff Solar, PowerPoint Systems (Ea) Ltd., Sollatek Electronics (Kenya) Ltd, Wilsons Power and Technologies Ltd, Winafrique Technologies Ltd. Energy outfitters ltd, Green Rays energy ltd, solar energy and renewable energy ltd, Sun power technologies ltd, ptl Solar FZ LLC(solar panels manufacturers Kenya 2013)

Companies that deal with wing energy include: Greenmillenia energy Ltd,East Africa wind energy ltd,Ecosolar options ltd(solar and wind energy),Energy outfitters ltd,Kijito wind power

ltd, Adept Pacesetters Ltd(solar and wind energy), Craftskills East Africa Limited(wind and solar), Solar Homepower.
Waste to energy companies includes: African bio products ltd (Energy source guides.com/Kenya 2013)
Kenya Electricity Generating Company (KenGen) and Geothermal Development Company (GDC) have been exploring geothermal sources

6.3 Universities and research institutes; their role in further education and regional development

University of Nairobi together with the Ministry of Energy are cooperating with the German Aerospace Center (DLR), the Ri National Laboratory and the National Renewable Energy Laboratory (NREL) in the production of wind and solar assessments for Kenya (Developing renewable energy sept 2006) and the university is in the process of offering renewable energy courses.(energyrecipes.org/Kenya 2006.p.3)
In March, 27, 2012, Jomo Kenyatta university of Agriculture and technology (JKUAT) organized for a day long workshop focusing on how Kenya could exploit the abundant renewable energy resources through training and research to foster the country's rural development was opened at the university. The workshop brought together 50 participants from the country's public and private sector together with researchers from JKUAT and two leading universities in Japan signals the beginning of a four year collaborative study initiated by JKUAT and JICA to carry out intensive research aimed at scaling up the utilization of renewable energy in Kenya(JKUAT renewable energy project 2012)
On the other hand, Kenyatta University is offering a course in energy engineering for bachelor's degree (Kenyatta University 2013.p.03, 11, 35,)

7 Conclusions

Renewable energy available in Kenya were Hydropower, Geothermal energy, Wind power, and solar energy, Biogas, Biomass, Co-generation, and Bio-fuels and that there was not so much competition in the renewable energy market except in solar where there were many players in the market already but there was room for growth.KenGen controls about 80 percent of market share especially in electricity production through hydro. There is existence of prices by the regulator. The customers in the market were the Kenyan people, Government, Ngo's, and United Nations.
Kenyan government was encouraging investors to invest in the sector by use of feed in Tariffs for electricity connections and in others forms such as biogas and solar energy, tax exemptions on equipment were given by the Kenya Government.

Even with the discovery of oil in Kenya there more room for renewable energy growth because it is underexploited.

According to Kenya's vision 2030 strategic plan, electricity demand has been rising significantly in the country mainly due to increased productive investment and increasing population and the supply had not met the demand.Kenyas vision 2010 strives at having electricity access from current 30 percent to 70 percent. Therefore there need more investment in renewable energy in order to meet energy deficit. Also with shortages of power and rising costs of electricity Kenyans were moving towards cheaper and reliable sources to meet their demand.

There is a lot of potential in solar energy in Kenya as there is high insolation rates with an average of 5-7 peak sunshine hours and also had the most active commercial PV system market in the developing world. There were about 4 million households in rural Kenya alone which present a vast potential for this virtually untapped technology. About 200,000 rural households in Kenya which had solar home systems. This success was largely due to private sector activity and there was more than 4 million Kenyans living in rural areas without electricity, private companies can sale of products that best fit the purchasing power of rural households, and by making these products available within the mobility range of potential customers

Kenya has the potential for up to 3,000 MW of wind, especially in the wind-rich Northern frontier districts hence this should be considered for investment.

The future of renewable energy in Kenya is bright because about 75% of electricity in Kenya was expected to come from Renewable energy.

7.1 Limitations

Most respondents did not answer my questionnaires even after previously accepting to do so.Lack of cooperation from government agencies and private companies hindered the research.

Sometimes there was luck of proper documented specific information.

More renewable energy sources have been discovered recently such as oil in Turkana and the coastal Kenya.

7.2 Future research

After research in the renewable energy situation in Kenya, renewable energy potential is enormous therefore the CONNECT project should do more research to ascertain the specific renewable energy sources potentiality according to the current 47 county governments and find ways of engaging with them in order harness those opportunities.

Also the CONNECT Project should consider doing collaborative research with local universities in kenya yearly basis to be able to get upto date information.

The Finnish foreign ministry should consider engaging Kenya's ministry of foreign affairs on mega projects such as in geothermal energy in order to offer expertise to Kenya government and also identify opportunities for Finnish SME'S to venture into providing solar energy solutions, biogas and even engaging the county government on waste solid waste management in towns and providing energy.

Research should be done on biogas and waste to energy.

The renewable energy sources in kenya are many and hence research should be done for each specific one so as to get more specific and important information and advice the finnish SME's on the same.

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Appendixes

Appendix 1 Response from FinPro
Questionnaire

RENEWABLE ENERGY IN KENYAN MARKET

1. What kind of renewable energy solutions are there in the market already**?**

At Finpro they had come across the following solutions:

1. Solar wind hybrid power for telecom masts (Winafrique)
2. Solar heated water (solar collectors)
3. Many off-grid micro solar PV solutions: solar lanterns, solar cell phone Chargers, etc.
4. Wind power: KenGen (5MW at Ngong Hills with plans to expand) and planned 300MW project at Turkana.
5. Geothermal: +200MW by KenGen and independent power produces
6. Hydro power was discouraged as it was not reliable in Kenya due to unpredictable water levels that lead to electricity disruptions.
7. Biomass (in this case wood) was of course used extensively as cooking fuel.
8. Biofuels are produced in very small scale. Ethanol production was planned at the sugar plantations. Jatropha was being research as a source of biofuel
9. Burning of bagasse (waste from sugarcane) produces quite a bit of electricity to the grid. E.g. Mumias Sugar produces their own electricity by burning bagasse and sells the extra to the national grid.

2 a) how tough was the competition? And who are the competitor?

- Small off-grid renewable energy solutions market:

We were not familiar with all the competitors because there are several operating and have not dealt with them. To my understanding the competition in this market segment was fairly tough as there are many players.

- Electricity production for the national grid:

KenGen was the largest power producer in Kenya and its installed capacity was roughly 80% of the national total. Market was dominated by the parastatal and some independent producers exist. Geothermal Development Corporation (public institution) would like more private involvement in the geothermal energy.

b**)** How about the price level**?**

They were not aware of the price level and he was not sure what price level being referred to, each individual source? They were not aware of this. I know that geothermal was the cheapest form and thermal was the most expensive. Price per Kwh sold by KPLC can be found online and it changes as usual.

2. What kind of subsidies, tax reductions and etc. can you get from renewable energy?

They were not aware of this as we have not worked on these issues when it comes to renewable energy. However, there is a law coming that would require all building have a solar heated water system.

3. If you were selling renewable energy solutions who were the buyers (who pays the bills?)?

Kenyan government (KenGen), UN and NGOs buy renewable energy solutions.
Also private individuals had solar collectors and solar PVs. Wind and solar solutions were also used by private companies. E.g. Safaricom had a few wind solar hybrid solutions electrifying their masts. One private company was in geothermal energy.

4. In your opinion, who were the main customers?

It depended what kind of solutions you were talking about and to which market segment it was aimed at.

5. How was the buying pattern in relation to prices and quality?

We have not studied this and are not familiar with this issue, but my educated guess would be that price matters more than quality.

6. How would you rate demand versus the supply of renewable energy solutions in Kenya?

The supply was there, but demand has not picked up as new technology takes time to settle in so that people understand it and can trust it. Price was also an issue as some solutions require relatively high upfront costs.

7. Now that oil deposit has been found in Kenya, do you think that it might affect renewable energy business in Kenya?

The oil needs to be in commercially viable quantities to have had any effect and that was not sure yet. Also the benefits of oil would only come in roughly 10 years. There could be a slight effect on the enthusiasm over renewable after production of oil has begun or was about to begin. In the end the oil would be largely refined for motor vehicle use and so would not affect electricity prices. Oil based fuels may become cheaper, but I don't think this would have long term effects on renewable energy.

8. Among the renewable energy solutions, which were the most unexploited in Kenya?

There were many that were unexploited. Geothermal was expanding fast due to this.
Also various forms of biofuels and biogases were unexploited. Solar was in use. No one was sure if wind energy was feasibly in Kenya due to the infrastructure costs and high upfront costs. If the 300MW wind park eventually takes off and proves viable then they could know if can be exploited. If yes, then it would be unexploited.

10. How can you rate the growth of use of the following renewable sources?
a) Solar power
If the law requiring solar collectors passes the parliament there will be huge demand. Solar power was used quite a lot already, but there was much space to grow.
b) Wind power
Kenya had 5.1 MW installed by KenGen at the Ngong hills and there were plans to expand it. If the Turkana project proves successful then there could be growth. But if the problems persisted, as it had been a pipe dream for quite some time, and the infrastructure was not sufficient to build wind parks and if the financing was not there, then there would be little further growth.
c) Biomass
Biomass was the most used source of energy in Kenya and was used as cooking fuel.
Kenya does not have huge biomass reservoirs (when it comes to trees) and so not a good solution. But some biofuel solutions may emerge.
c) Waste to energy
Waste to energy was use very little at the moment. There were small scale bioenergy solutions utilizing biogas from farm waste. JKUAT had a few students researching biogas solutions so there could emerge Kenyan bioenergy technology that used waste. Waste at the dump yards was not utilized and no waste burning was happening.

He did not see it happening any time soon either. High upfront costs are not the main issue. Neither the cities nor the government wants to finance waste to energy projects.

11. Generally what is the future of renewable energy in Kenya?

The future was promising and there were small Kenyan "green" solutions coming day by day. Renewable energy technology was relatively high-tech and often expensive and so not attractive at the moment when cheap, but non-renewable solutions exists. In Kenya it was hard to predict what would happen, but everybody was very optimistic and there are positive signs here and there over renewable energy

Appendix 2 Response from Kenya Electricity Generating Company

Questionnaire

RENEWABLE ENERGY IN KENYAN MARKET

1. What kind of renewable energy solutions were there in the market already?

   i) Hydropower
   ii) Geothermal energy
   iii) Wind power
   iv) Solar energy
   v) Biogas
   vi) Biomass
   vii) Co-generation
   viii) Bio-fuels

2 a) how tough was the competition? And who are the competitor?

   i) KenGen (a public organization with 70% government shares) has about 80% share in the electricity market
   ii) Other forms of energy such as bio-fuels and biogas are on small scale and done by private investors
   iii) Orpower an IPP has geothermal generation
   iv) Mumias Sugar Company does little Co-generation of power
   v) The competition was thus not very tough so far.

b) How about the price level?

This was controlled by Energy Regulatory Commission especially electricity but was seen to be higher than other African countries such as Egypt.

2. What kind of subsidies, tax reductions and etc. can you get from renewable energy?

In terms of electricity, there are special tariffs called feed-in-tariffs for grid connected power.

In others forms such as biogas and solar energy, tax exemptions on equipment were given by the Kenya Government.

3. If you were selling renewable energy solutions who are the buyers (who pays the bills?)?

Renewable energy was sold on the open market just like other forms of energy.

4. In your opinion, who are the main customers?

The Kenyan citizens were the customers but there are plans to interconnect with the Eastern Africa Power Pool in terms of electricity (Eleven countries)

5. How was the buying pattern in relation to prices and quality?

Energy Regulatory Commission regulates the energy market but efforts are being done to increase the liberation rate.

6. How would you rate demand versus the supply of renewable energy solutions in Kenya?

The demand was higher than the supply. they had a suppressed demand of about 30% in the case of electricity. We need a reserve margin of about 30% as per our long term National Strategy called Kenya Vision 2030.

7. Now that oil deposit had been found in Kenya, do you think that it might affect renewable energy business in Kenya?

   Oil will enhance the portion of renewable energy for national strategic reasons. A sovereign oil fund was being discussed and this showed the awareness of the Kenya Government as regards the finite oil wealth compared to renewable energy.

   As regards electricity, most countries limit their wind and solar power component to about 30 to 40% while using other firm power sources to stabilize the power grid. This means oil could create more room for wind and solar power in Kenya.

8. Among the renewable energy solutions, which were the most unexploited in Kenya?

   i) Wind
   ii) Solar
   iii) Biomass
   iv) Biogas
   v) Waste to energy

10. How could you rate the growth of use of the following renewable sources?

a) Solar power – very slow (below average)

b) Wind power – Slow (Average)

c) Biomass – Very high but not well managed (Above average)

c) Waste to energy – Very slow (Below average)

11. Generally what was the future of renewable energy in Kenya?

Future of renewable energy in Kenya was very bright. For example, more than 75% of electricity in Kenya could come from renewable energy over the next 25 years